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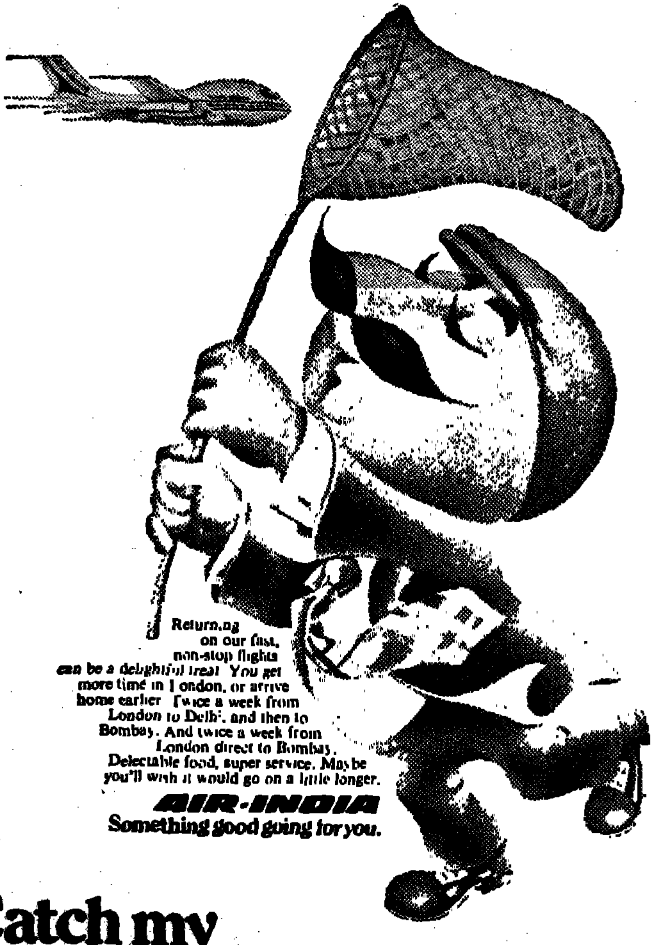

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S. P. VARMA
REGISTRAR

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Hony. Editor : ANJNI KUMAR

Universities and National Development

Linkage with Environment

Madhuri R. Shah*

At the very outset it may be pertinent to analyse the significance of the two terms involved in our discussion. The term environment is a multiordinal word and will have a significance in the context in which it is used. It will have, therefore, two important facets—the physical environment, and second, the social environment. The physical environment has today assumed a place of importance and has secured for itself a prestigeous position as an inter-disciplinary subject. Many universities today offer courses in environmental studies. The juggernot of technology has created numerous problems for the society. It is commonly said that technology itself must correct its own corruptive influences and this, therefore, has been the basis of introducing such inter-disciplinary subject to avoid the fate of ecocide. It is, therefore, necessary for the universities today to recognise, to foster and to advance through research the different aspects of environmental study which will be pluridisciplinary subject including life sciences, physical sciences—both physics and chemistry—social sciences and also architectural sciences, inclusive of town planning and city layout.

Environment, interpreted as social environment, has to take into account the society's placement as urban and rural, the various activities that society pursues as industries, business and professional practices and also its administrative units. When we, therefore, think of university's linkages with this facet of environment, we must take into account these various aspects into which social environment may be broadly classified.

It may be necessary at this stage to broadly define what is meant by linkage. Permit me to illustrate this point figuratively. In a silversmith's shop a huge horse-shoe magnet was hung from the ceiling as a decorative piece and, perhaps, for luck. This magnet fatally fell in love with a beautiful silver vase that was displayed on the shelf. The poor thing did not realise that with all the electro-magnetic lines of force that it could throw out towards its object of love it could not establish a link, and by the very nature its love was destined for frustration. A link can only be established, provided a polarity is established where we propose to bring about a linkage. It must be understood, therefore, that a linkage is not lassooing of an unwilling party. Linkage, therefore, is a two-way understanding which alone can bring to fruition the objective of such a linkage.

The interdependence of university and industry needs no arguing. The progress of much fundamental research in the university depends both on economic help from industries and industrially produced sophisticated instruments and apparatus on which all advanced scientific research is based. On the other hand, the future of industry depends upon availability of highly trained graduates not only for its day-to-day working but for innovative approaches on which the growth of industry finally depends. Unfortunately, this linkage of the university and industry has not been forged so very strongly in our country. There must be a planned and organised effort to bring about a closer contact with these two facets—the university and the industry. Equally well, there should be a greater association of the

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**Vice-Chancellor, S.N.D.T. Women's University, Bombay.*

business houses with the university. Number of universities today offer courses which are oriented towards management and banking. If the university is thus giving the business houses a trained personnel, the reciprocity for such a contribution is not forthcoming. It may be suggested that the industrial and the business houses must voluntarily impose upon themselves out of their quantum of profits a small percentage towards the recurring expenditure of the university finance. I would like this to be made operative not through a government agency but on the voluntary bases of these spousers. Today universities are in the red as far as their financial position is concerned. The U.G.C. and other enlightened donors usually assist the universities on their non-recurring facets of expenditure. Many a time such a munifiscent donation finally becomes a white elephant for the university for its continual maintenance since the recurring expenditure is not forthcoming.

The university was born in the city—Salemo, Bologna, Paris and Prague. However, some of the elitist universities, like Oxford and Cambridge, with their aversion to the evils of the city, established themselves outside such limits. But these universities whether in the city or outside its walls pursued their activities with an ivory tower isolation. Today, universities have moved into the market place and must elevate the status of the market place.

This concept of the link highlights the university's supreme obligation to wipe out adult illiteracy. *Permit me to offer my few observations on the obligations* of the university in this respect. The educational institutions at different levels of the educational process must totally participate in this national effort. Of such an effort, the university must have a new dimension added. If the students of the university be trained to participate in adult education, I think the teachers of the university should be trained to teach the fundamentals of democratic behaviour and conduct as well as of governance to those who conduct such duties at the grassroot of administrative process, the Panchayat Raj.

One has to explore as to what kind of linkage the university needs to establish with the professional environment comprising lawyers, doctors, engineers and technocrats. Such a linkage today is non-existent. I do not suggest that this link be a financial nature as a professional cess which has been imposed upon some of the states in our country. I will prefer this association to have an academic character. Such a character can be unfolded in different manners. Arrangements should be made for the graduate trainees in the different professions to be accepted for purpose of training in the pursuit of that profession. In few instances, the leading lawyers have what is known as deviling system. The medical training has a dimension of internship. But all such efforts are presently pursued in a fragmentary manner and a planned approach is lacking.

The last linkage which I would indicate with the environment is within the educational environment itself. Today, the schools and colleges and various polytechnics work in isolation of each other. There is an urgent need to explore the school college complex and even further, the school-college-industry complex.

I have already mentioned that if the objective of the link is to be effectively achieved, there must be polarization with the facet of the linkage and one of the essential conditions for such a polarization for the university to achieve in the society in which it functions is, for the university to establish its credibility and accountability both in respect of its academic functioning and its financial disbursement. It may be a harsh but a true observation that today universities are completely in disarray. The curriculum construction stands in a confused state, the academic faculty vociferous with reference to their rights are oblivious with respect to their obligations and with such two adverse factors, the central figure of the educational system the pupil is completely in a puzzled state of mind. In this centinual year of birth of Einstein, permit me to refer to a few of his thoughts. He was a very strong supporter of 'free learning' by which he meant that any one desirous of pursuing his studies should not be required to produce as usual certificate of "general education", but that he must give evidence of his fitness to follow the reasoning of a discipline through a specially designed evaluating process. Today at my university, I am in a small measure experimenting with this idea by opening the doors to women who can give such an evidence and who are above the age of +21. There is another aspect which is indeed though of a revolutionary nature is pertinent in respect of educational system. Einstein indicated his deep interest in younger generation, whose development be considered threatened by nothing so much as incapable teachers and on this he suggested that the pupil be examined as little as possible, but the teacher so much, the more closely. Here is not the place to discuss in detail the curricular construction of which the highways and byways the students are led to their destined objective, because it is the finished products that we send out in the society are our living lines of force with the environment.

I have very broadly and cursorly referred to the few of the linkages that our university should establish with the environment. ☐

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Universities and National Development

—Internal Management of Universities

P. Sivalingam*

National development

The development strategy of our country is based on national policies regarding economics, land utilization, industrial location, agriculture, urbanisation, social housing, transportation, energy, environment, land-ceiling, rural development etc. The tasks involved in the implementation of the various development programmes are indeed gigantic and complex, particularly so when an integrated view has to be taken of the resources in men, materials and land with the object of optimising production and providing gainful employment to everyone. Plans and programmes for development must be implemented at the national, regional, district and village levels and these require planning and management talents of the highest order. The purpose of universities is to provide trained man-power to meet this critical management input and the task of educational institutions is to develop a talent pool that is needed by the collective society.

Review of university education in India

There are 112 (1976) Universities in India (the present number is 115), comprising 4500 colleges with 25 lakhs of students. Nearly 80.7% of our students are in the Arts, Science and Commerce streams, 9% in the Education and law-disciplines, 4.3% in the medicine, and a mere 5.2% are oriented to engineeering and agriculture. Undue emphasis in the Arts courses (44.5%) and lack of emphasis on agriculture (1.2%) are disturbing factors.

Considering the emphasis on various aspects of university education, undergraduate education has assumed the major importance (88.5%) and emphasis on research is rather insignificant (0.7%). Post-graduate education is geared to 9.1% of our student enrolment. Only one out of every 260 citizens of India is in a position to obtain University education.

A more disturbing trend which is not readily apparent from mere statistical data is the preponderance of those activities in our universities which are oriented to benefit the privileged classes, who command nearly 80% of the goods and services generated in this country.

Governance of universities—Review committee reports

The Kothari Commission (1964-66) and the Gajendragadkar Committee (1971) have studied the problem of governance of universities and the following observations deserve special mention.

(a) The function of a university today, is not only to enable students to attain excellence in knowledge but also to contribute directly to national development.

(b) A university stands for humanism, for tolerance, for reason for the adventure of ideas and for the search for truth. It stands for the onward march of the human race towards even higher objectives. If the universities discharge their duties adequately, then it is well with the nation and people (Jawaharlal Nehru, 1947).

(c) New challenges have been thrown to university education by the claims made by teachers and students, for active participation in the administration and academic affairs of the universities. This adds a new dimension to the problems of Governance of Universities.

(d) There is a growing feeling that Universities must come out of their 'ivory towers'. This involves a radical change in syllabi and structure of our courses.

(e) There should be greater contact between higher education and the problems of life and society,

(f) There is little chance of the Universities fulfilling the above legitimate expectations, unless higher education and research are given much higher priority in the national scheme of things, than at present. Expenditure on higher education and research should be considered not merely as an essential social service, but as an investment for the future with the possibilities of unlimited and rich dividends.

(g) The finances of Universities are almost entirely provided from public funds; the tuition and examination fees paid by the students do not amount to more than a quarter of the total budget. This being so, the universities and the Governments (State and Central) have to and should work in close collaboration.

(h) Thus the future university system should be sensitive to the changing conditions of society and shifting pattern of thought and behaviour, and must be ready to meet new demands and requirements.

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*Vice-Chancellor, Perarignar Anna University of Technology, Madras.

(i) The 'public image' of the Universities should be such as would inspire general confidence and respect for them, and promote and strengthen the community's trust in their work and capabilities, and faith in their future. University organisations should prove to the community at large that debate and dialogue, communication and exchange of ideas carried on freely, fearlessly and objectively, can solve all problems.

Gearing education to the needs of the society

The knowledge explosion is a fact of life. Every forty minutes, enough new information is being generated to fill a twenty-four volume encyclopedia. The task of communicating information in the academic disciplines is becoming untenable as a teaching function. Yet our present model of education is based on academic disciplines which forms too narrow a base on which to build society. When we attempt to cast every one in the same mould, we sell short both society and industrial human beings. It is time for some new models of education that are true to the integrity of the individuals as well as the needs of the society.

We might begin our reforms, by gearing education to the needs of the society by matching the cultivation of individual talents to social needs in a three dimensional model, patterned after skills needed in occupation. It is now well-known that three distinct skills, namely, working with data, working with people, and working with things, and combinations of the above are required for most jobs. The task of future education is to develop the students' greatest talent among these areas to the point of excellence and also preparing him for his environment by developing at least minimum competence, in the other two areas. The development of interpersonal skills would no-longer be left to extra-curricular activities and to chance, and they would also be required to develop basic competence in the manipulation of tools and materials. The advantage of this programme in our egalitarian future is that it recognizes individual differences and gives more people an opportunity to make real and valued contributions. The educational advantage of the proposal is that it permits us to establish realistic standards of performance.

Planning and management in universities—a British study

A planning and management study in British Universities was conducted in 1971 by the University Grants Committee of England. Some of the important recommendations of this Committee are worthy of adoption in Indian Universities.

(a) Management of Universities is not merely a technique, nor is it a manipulation of a range of techniques. *It is an art* which relies heavily on the exercise of human judgement; but it is becoming increasingly necessary to ensure that judgement is based on adequate information and modern *management science* is concerned with the systemisation of that information. Thus the art, science and technology of management are interrelated and each is indispensable. Universities are expensive and vital institutions of education and scientific management on the lines of a corporate organisation is necessary for increasing the institutional efficiency whilst fulfilling the needs aspirations and hopes of its members.

(b) The challenge for University administration lies in building on the enterprise of the individual whilst ensuring harmony and coordinated progress of the institution.

(c) University structure and its processes should be integrated into a single and coherent management system. The committee structure, the group structure and the officer structure of the various Universities must act in consonance so as to maximise the resultant output in quantity and quality.

(d) Initiative and responsibility should be developed as close to the point of action as possible i.e. to the individual departments.

(e) Universities should take steps to evaluate their activities and performances periodically. Ideally all activities should be evaluated; there should be staff and student feedback on the effectiveness of teaching and curricula; research projects should have their outputs recorded and assessed; there should be feedback mechanisms from graduates and employers about their perception of the value of the University's courses in the light of work-experience of the graduates.

(f) Three levels have been suggested for University organisation, namely, the University authorities, the areas of study, and the units. In terms of academic groups the departments are at the unit level, the faculty is at area level and the Vice-Chancellor and the senate, syndicate, council and court are at the university level; a subsidiary level is envisaged for research centres and institutes of advanced study. This is a normal number of levels found in a typical University of 5000 to 6000 students: and the minimum necessary to follow the system of planning and management commended in this British Study. As a result, the length of the decision chains in the committee structure are relatively manageable and tiers and spans of control in the Officer structure acceptable. Incidentally, the span of control (horizontal interaction) is to be limited to nine in number.

(g) It should be recognized that the various activities of the Universities are inter-related. No individual or group can act effectively in isolation. Everyone is dependent on others in his work and in his pursuit of interests. If our Universities cannot foster growth and development in the younger-minds with a commitment to help the less privileged and act with a sense of co-operation what other institution can?

Recommended plan for action in the Sixth-Plan Period

National development in a highly populated and fast developing country such as India, requires massive, dynamic and time-bound programmes of action.

These programmes should be based on adequate planning and implemented with adequate managerial skills. Progress of a nation is ultimately based on availability of right information, knowledge of procedures and knowledge of technology at the grass root level. The dissemination of this knowledge should start from the universities and must gradually seep to the masses, through appropriate channels of information processing. The concept of "each one teaches one more" should be practised diligently.

Universities and rural development

Universities are both the products and the causes of changes in society. They cannot remain in isolation from the stresses and strains resulting from or involved in such change. In India the majority of our population lives in the rural areas. The impact of higher education and the advances made in science and technology have not yet permeated to the rural areas to the extent they should. It is therefore necessary that the Universities devote themselves to activities which are of immediate relevance to conditions existing at present in our villages. In this context the task of identifying technologies appropriate to our rural development must be given top priority in the activities of our Universities. The time has come when every university in the country should dedicate itself to this major task and participate more actively in such nation building activity.

Only one out of 260 citizens of India have access to University education. With the massive investments on infrastructure facilities such as land, buildings, equipment already made, it should be possible to educate at least twice the existing number, through non-formal education, continuing education, adult education and part-time classes, and education planned for community needs.

The areas of study and enrolment pattern in our Universities are heavily biased towards Arts, Science and Commerce streams and emphasis on post-graduate education and research is inadequate. A rethinking on the need for socially relevant research programme is of paramount importance.

One of the goals of university education is to develop the students' talents and to inculcate minimum levels of competence in working with things and interacting with people. The development of inter-personal skills should no longer be left to extra-curricular activities and to chance.

As a first step, the semester pattern of education and the scheme of full internal continuous evaluation should be introduced in all the courses of study. As a second step, the syllabi and curriculum should be modified for each area of study so as to have more social relevance. It would be worthwhile to introduce new subjects of study relating to rural development in addition to the conventional subjects. The concept of appropriate technology, study of environmental problems, recycling of waste water and utilization sewage effluents, study of non-depletable energy sources etc., should be given greater importance in our curriculum. Project work of the students should be oriented towards rural development. Even though most of the concepts mentioned above are engaging the attention of the government, our Universities have not yet realigned themselves fully to this task. Students and staff alike should be made aware of this responsibility to the society and encouraged to take a keen interest in such activities.

Universities should encourage their staff to play a multitude of roles such as educating students, imparting training to practising professionals, participating in seminars and symposia, undertaking consultancy and research, participating in the developmental activities of the nation and helping in the day to day administration. All these activities should be officially recognized. Credit points may be awarded for the various activities of the teachers. Credits for each subject/semester taught by a teacher can be initiated on a nominal scale. Similar credits could be worked out suitably for various other activities. Every teacher should be required to generate sufficient number of credits/years, either through teaching only or teaching plus other combinations of activities. Some test of evaluation of teachers is inevitable and this can be left to the Academic Councils of the various Universities. This approach will require the submission of work-load budgets for each year, by the staff members and their approval by competent authorities of the university, sufficiently in advance, so that planned activity of a teacher could be ensured.

Reorganisation of our Universities for teaching and training in modern methods of management and for restructuring existing courses to satisfy well identified social needs is very vital.

The State and Central Governments must spearhead the reorganisation of Universities within the Sixth Plan period on a war-footing just as they are presently doing on the agriculture, energy, irrigation, industrial and rural development fronts.

Substantial financial allocations should be earmarked for University education. The true wealth of a nation is its people and the highest productivity is in human capital. Investment in education, will, in the ultimate analysis, pay the highest dividends in the form of production of leaders of integrity and infusing the people with a sense of commitment and devotion to social ideals. This represents a return of priceless value to the community.

Finally, Universities should function as corporate organisations, accountable to the society in the long run.

If the above simple tasks are undertaken on a priority basis, our Universities will be able to directly participate in national development in the very next decade. The management techniques, required for this kind of development are already available and what is lacking is the required will and dedication of the students, staff, university management and the Government. If the Universities desire to retain their legitimate responsibility of leading a country, then, they have very little choice except to act as above. Otherwise the gap generated due to inaction will be filled in by those who are more ambitious and determined to achieve their personal ends. □

Unit Cost of College Education

A case study of Hindu College of Delhi University

G. D. Sharma*

The cost is an important aspect of management and planning of the university. Even when one thinks about linking the university with the community one obviously thinks in terms of initiating some educational programmes which links the university with the society and the environment around them. Such programmes have some resource implications, in other words some costs. The study of unit cost therefore becomes important for efficient management of university as well as planning for any new educational programme or for that matter linking the university with the society. The affiliated colleges of the university although function independently so far as their budgets are concerned, yet they are very much integral part of the university. The effective linkage are established through these units only. Therefore, enquiry into the unit cost at the college level also becomes very important for the similar reasons.

Most of the cost studies conducted in India estimates only per student expenditure in aggregate form. Such studies normally do not unfold many aspects of costs, particularly the costs of various educational programmes/courses. The present study therefore attempts to examine unit cost of education by courses/subjects in a college affiliated to Delhi University.

In brief, the objectives of this study are as follow:

To examine:

(a) Unit teaching cost per lecture, by courses and subjects
(b) Unit cost of education by courses/subjects
(c) Product unit cost i.e. the cost of producing a graduate
(d) Wastages due to failures and dropouts
(e) The size of class/department where unit cost is the least

On the basis of above it suggests some policy measures relevant to utilization of resources and for better institutional planning.

Methodology

The mathematical model mentioned below explains the steps taken for estimation of unit cost.

Mathematical Model

$$UC = \frac{TC}{S} \qquad (1.1)$$

$$UCH = \frac{TC}{CH} \qquad (1.2)$$

$$UCO = \frac{TC}{SO} \qquad (1.3)$$

$$UCHS = UCH \times \frac{CH}{S} \qquad (1.4)$$

$$W_t = UCD - UC \qquad (1.5)$$

$$TC = W + TM + SU + EVU + SA + SMG \qquad (1.6)$$

Where

TC = Total cost incurred by an educational institution
W = Teachers Salaries
TM = Expenses on teaching material (including laboratory and library expenditure)
SU = Salaries of Supporting Staff
EVU = Economics value of space and infrastructure used
SA = Cost of students amenities (Hostels and other facilities)
SMC = Students Maintenance Cost—Scholarships for maintenance
S = Number of students in a class/institute—i.e. size of an institution
CH = Credit Hours; being defined as number of lectures (one hour duration) delivered
SO = Students output
UC = Unit cost per student
UCH = Unit cost per credit hour
UCO = Unit cost per product
UCHS = Unit cost per student credit hours
W_t = Wastage per student

For examining the influence of size on unit cost we have the following form

$$Y = (x^1, x^2, x^3, x^4, x^5, x^6, \ldots x_n)\, U_1$$

where

y = Unit cost
x^1 = Credit hours per student
x^2 = Size of the institutions
x^3 = Per student expenses on teacher, salaries and teaching material.
x^4 = Per student expenses on salary of supporting staff
x^5 = Number of credit units. Credit units being defined as reading and other facilities made available by the institution
x^6 = Economic value of space and infrastructure used.
U_1 = Error term

The model presented here is comprehensive one for a detailed study on this aspect. The present paper is limited in the scope in the sense that it examines only recurring unit institution costs.

Data problems

In the process of collection of data, following problems were faced:

1. The major hurdle in estimation of unit cost

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*Research Officer, AIU.

was non-availability of data [illegible] at one place. Most of the [illegible] purpose of this study are [illegible] basic sources namely accounts registers, attendance/lecture registers, which are kept in a very scattered form.

2. As the general as well as salary accounts are not maintained according to departments/subjects or by activities, there was a problem of reallocation of expenses according to department and subjects.

3. Information regarding input and output that is students admitted and those who completed their graduation within stipulated time were not properly kept. Added to this was the problem of students who took fresh admission at every stage in 3 years degree course. *Thereby making it further difficult to* keep the parameters constant. Here also a great deal of efforts were made in tracing the progress of the students admitted in 1973-74 and passed out in 1975-76.

4. The number of lectures delivered are kept in aggregate form. In the case of subsidiary subjects separate details about the number of lectures delivered were available only for the year 1973-74. There was, therefore, some problem of estimation and adjustment.

The type of adjustment made and the way in which the problems solved are briefly mentioned below:

METHOD OF ADJUSTMENT AND ESTIMATION

Teaching cost

The teachers' salaries were, initially taken form the salary account for each of the teacher in the respective subjects. While doing so due care was taken about the permanent and temporary staff and the staff on leave vacancy. Salaries of teachers of respective subjects were allocated to various courses/departments on the basis of number of lectures delivered by them to the students of various courses. That is to say if a lecturer of English had delivered some lectures to the students of Economics (Hons. Courses) they have been attributed to Economics (Hons.). Similar adjustment were made for other courses and the teaching costs were attributed to such courses accordingly. In doing so help of per lecture teaching costs in various subjects were taken. The *per lecture teaching cost was an important variable* which helped in solving many problems related to estimation of unit costs by subjects and courses.

Administrative cost

General administrative expenses are proportionally allocated on the basis of size of the department/course. The size was determined by number of students in each course/department. This means general administrative expenditures which were not specified to any department proportionally went to each of the departments/courses.

Laboratory expenses

The expenses on science laboratories and supporting staff in the laboratories were attributed according to number of laboratory practical hours utilised by respective subject/course. Practical hours variable helped in allocating laboratory expenses in proportion to number of practical hours attended by students belonging to various subjects in science faculty.

Adjustment for lecture hours

In most of the cases data regarding the number of lectures delivered were obtained from the attendance register where number of lectures delivered in respective subjects were mentioned. These lectures were further attributed to respective courses/departments. In the case of subsidiary subjects as the figures were only available for one year i.e. 1973-74, for the subsequent years number of subsidiary lectures were assumed to be the same as that in the 1973-74. The proportion of such hours in 1973-74 to expected subsidiary lectures were worked out and the same proportion was applied for the subsequent years. This method accounts for any increase and decrease in subsidiary lectures as provided in the time table. As the data regarding practical laboratory hours were not available they were assumed to be the same as that of proportion of theory hours to the expected theory hours and the same proportion was applied to expected practical laboratory hours for the respective subjects.

Intake and output

The number of students admitted in the year 1973-74 and the number passed out in 1975-76 were studied by tracing the progress of students in various courses throughout three years' period. In this process wastages and stagnation at every level were also examined and number of students finally completing the graduation degree was worked out.

Details about the investment on building and other educational infrastructure were not readily available. Therefore, cost of equipment, building and other infrastructure which are being used by the students have not been estimated here. Any method of discounting of capital investment or alternative cost could not be worked out in the absence of such details. The analysis is therefore limited to recurring institutional cost.

Unit Cost Estimation

Per credit hour teaching costs

Credit hour, as stated earlier, is defined as lecture of 45 minutes duration delivered by the teacher. Per credit hour teaching cost has been worked out dividing the total teachers' salary costs in various subjects by number of lectures delivered by the faculty members of the respective subjects. The details regarding per credit hour teaching cost by courses and subject are given in *Table No. I*. Average per credit hour cost for all subjects/courses as on 1973-74 works out at Rs. 88. In 1974-75 and 1975-76 this cost increased to Rs. 181. and Rs. 124 respectively. That is to say for one lecture of 45 minutes duration institution spends around Rs. 124 on the salary of teachers. Per credit hour teaching costs differs from faculty to faculty and within faculty from subject to subject. The detailed analysis by courses, faculty and subjects is presented below:

Arts and Humanities (Hons. Courses)

Average per credit hour cost in Arts and Humanities faculty in 1973-74 works out to Rs. 101. In 1974-75 and 1975-76 it increased to Rs. 103 and Rs. 109. There are variations in per credit hour costs in various subjects in this faculty. For the year 1973-74 the highest cost was for Philosophy (Rs. 343). This was followed by English (Rs. 136). The cost was the least for Sanskrit (Rs. 63). The pattern of per credit hour cost has remained more or less the same over three years, however the magnitude of cost has increased in almost all the subjects but for Sanskrit. Where it has decreased by Rs. 2 only. For details see *Table No. 1.*

Social Sciences

For social sciences average per credit hour cost in 1973-74 works out at Rs. 78. In 1974-75 and 1975-76 it increased to Rs. 101 and Rs. 119. Like Arts and Humanities there are also variations in the per credit hour cost for social science subjects. In 1973-74 the highest was for political science (Rs. 93). This was followed by Economics (Rs. 76). The cost was the least for Sociology (Rs. 50). Over three years the pattern of costs remained the same, however, the magnitude of costs increased in all subjects in this faculty also. In 1975-76 per credit hour costs for Political Science, Economics and Sociology was Rs. 129, Rs. 124, and Rs. 85 in that order.

Mathematics & Statistics and Commerce

As on 1973-74 per credit hous costs for Mathematics and Statistics and Commerce was Rs. 78 and Rs. 63. In 1975-76 for these two subjects the cost increased to Rs. 92 and Rs. 139 respectively.

Sciences

Average per credit hour costs for Science subjects for 1973-74 works out at Rs. 91. In 1974-75 and 1975-76 this costs increased to Rs. 105 and Rs. 160. The increase was very significant in year 1975-76.

Among Science subjects per credit hour cost in 1973-74 was the highest for Chemistry (Rs. 123). This was followed by Physics (Rs. 117). For Botany the cost was the least (Rs. 36). Over three years the pattern of cost remained the same, however, the magnitude increased. In 1975-76 per credit hour cost for Chemistry, Physics and Botany was Rs. 203; Rs. 182 and Rs. 70 in that order.

In sum on an average for services of teacher for a lecture of 45 minutes duration about Rs. 124 are spent by the institution. The per lecture service cost is higher in Sciences, followed by Commerce, Social Science and Arts and Humanities faculties.

Per unit institutional costs

Unit costs

The estimates of per unit institutional costs include costs incurred both on teaching and non-teaching activities. Annual institutional unit costs for educating students in various faculties and subjects in the college under study is given in *Table No. 2. As on 1973-74 the college spent Rs. 1618 per student* per annum for providing instructions to them. This cost increased to Rs. 1962 in 1974-75 and to Rs. 2258 in 1975-76.

Per unit institutional cost varies from faculty to faculty and within faculty from subject to subject. The detailed analysis is presented below:

Arts and Humanities

As on 1973-74 average unit costs for Arts and Humanities honours courses works out to Rs. 1988. The cost was increased to Rs. 1891 in 1974-75 and to Rs. 2180 in 1975-76. Among the subjects in arts and humanities in 1973-74 the unit cost was the highest for Sanskrit (Rs. 3609). This was followed by English and Mathematics & Statistics. The least unit cost was for History (Rs. 1448). Over three years the pattern of unit costs in these subjects remained the same, however, the magnitude of costs changed. As on 1975-76 per unit institution costs was the highest for Sanskrit (Rs. 3315). This was followed by English (Rs. 2604). The least cost was for History (Rs. 1645). *See Table No. 2.*

Social Sciences

As on 1973-74 average unit institutional cost for social sciences works out as Rs. 1359. It increased to Rs. 1660 in 1974-75 and to Rs. 1891 in 1975-76. Among the subjects in Social Sciences per unit cost for political science was the highest (Rs. 1654). This was followed by Sociology. The unit cost was the least for Economics (Rs. 1219). The pattern of unit cost for these subjects remained more or less the same over three years however, the magnitude of cost increased to Rs. 2173, Rs. 2001 and Rs. 1686 respectively.

Commerce

For B.Com Honours course as on 1973-74 the per unit institutional cost was Rs. 985. It increased to Rs. 1487 in 1974-75 and to Rs. 1581 in 1975-76. Per unit cost in this course as compared to other courses was less.

Science

For science honours courses the per unit annual institutional cost as on 1973-74 works out at Rs. 1727. It increased to Rs. 2180 in 1974-75 and to Rs. 2482 in 1975-76. Among the subjects in this faculty in 1973-74 the per unit cost was the highest for Mathematics (Rs. 2127). This was followed by Chemistry and Botany. The cost was the least for Physics (Rs. 1554). The pattern of cost changed in this faculty over three years. In 1974-75 the least cost was for Zoology, that in 1975-76 it was for Botany. The position of Mathematics and Chemistry remained the same. However the magnitude of cost for all the subjects in this faculty increased. For Mathematics and Chemistry the costs was Rs. 3366 and Rs. 2807 respectively. (*See Table No. 2*)

General courses

Among general courses the per unit annual institutional cost for B.A. (Pass) course in 1973-74 was Rs. 1558. It increased to Rs. 2302 in 1974-75 and to Rs. 2643 in 1975-76. Per unit institution cost for B.A. (Pass) courses was higher as compared to B.A. & B.Sc. Honours courses.

The per unit cost for B.Sc. (General) course as on 1973-74 was Rs. 1893. It increased to Rs. 2271 in 1974-75 and to Rs. 3009 in 1975-76. Unit institutional cost for B.Sc. general courses was the highest among all the courses.

The per unit institutional cost for Fine Arts say Music was comparatively less. This was mainly because of the fact that major part of instructions in music is provided in the university.

In sum, the institution incurred about Rs. 2258 per student per annum for providing instructions in various Arts, Social Sciences, Sciences and Commerce subjects. The amount spent by the institution for instruction varies from faculty to faculty and within faculty from subject to subject. They also vary from honours and general courses. Per unit cost of instruction is higher in the case of general courses than in honours courses. The per unit cost is the least for B.Com (Honours) courses.

Unit cost of producing graduates

The unit cost of graduating students is examined by working out expenses incurred by the institutions during three years duration of course both on teachiing and non-teaching activities. They are estimated with reference to students who were admitted in 1973-74 and passed out in 1975-76. Here two types of estimations are made. First pertains to the cost incurred over three years period on number of students admitted; the other is to the cost of producing a graduate i.e. effective cost of producing a graduate. While working out effective cost allowances for wastages due to failure and drop outs have been given.

The average unit cost for three years' graduate degree course works out at Rs. 4772. That is to say on an average Rs. 4772 per student are spent by the institution for three years' degree courses. As on an everage due to failure and drop out Rs. 706 per student are lost, the effective cost of producing a graduate works out to Rs. 5478. For details see *Table No. 3.* This cost varies from faculty to faculty and within faculty from subject to subject. A detailed analysis of the same is given below :

Arts & Humanities

Average unit cost for three years' honours courses for this faculty works out to Rs. 5814. The effective average cost is estimated at Rs. 6616. That is to say on an average due to failures and drop out Rs. 802 per student are lost in this faculty. Among the subjects in this faculty the per unit cost is the highest for Sanskrit courses Rs. 1269. Although there are no wastages in this subject yet the cost is very high. This may be due to the fact that very small number of students choose this subject but minimun cost for providing instruction have to be incurred. This results in high cost for this subject. The per unit cost for Hindi and English was Rs. 6293 and Rs. 6017 respectively. The effective cost for Hindi works out at Rs. 7699 and that for English Rs. 6800. That is to say a sum of Rs 1406 and Rs. 783 per student are wasted away in these subjects. The least cost is for History (Rs. 4314). The effective cost for this subject works out at Rs. 4805. Thus Rs. 491 per student are wasted away in this subject.

Social Sciences

For this faculty average unit cost for three years honours degree course works out at Rs. 4134. On an average due to failure and drop out Rs. 795 per student are also lost away in this faculty. Thus effective cost increases to Rs. 4929. Among the subjects in this faculty the cost is the highest for Political Science (Rs. 4905). The effective cost for it is estimated at Rs. 5666. Thus about Rs. 760 per student are wasted away in this subject. Per unit cost for Economics was Rs. 4097. About Rs. 737 per student are also lost in this subject. This increases effective cost to Rs. 5666. The cost was the least for Sociology (Rs. 3221). The wastage per student in this subject was relatively higher i.e. Rs. 922. The effective cost for this subject thus increased to Rs. 4143.

Commerce

For commerce per unit cost for three years honours degree course is estimated at Rs. 3220. Here Rs. 432 are wasted due to failure and drop out. This increases effective cost in this subject to Rs. 3653. As compared to other faculty the per unit cost in this faculty was the least.

Sciences

Average unit cost for three years honours degree course in sciences works out at Rs. 4562. On an average about Rs. 452 per student are wasted in this faculty. This raises effective cost to Rs. 5014.

Among the subjects in this faculty the highest cost is for Mathematics (Rs. 8191). As Rs. 106 per student are wasted away in this subject, the effective cost increases to Rs. 8297. This is followed by Chemistry (Rs. 5252) and Physics (Rs. 5190). The least was for Botany (Rs. 1704). The effective costs for these subjects works out Rs. 5844; Rs. 5909 and Rs. 2297 in that order.

General courses

For B.A. (Pass) courses, the average per unit cost for three years degree course is estimated at Rs. 6084. On an average Rs. 1262 per student are wasted away in this course. Thus it increases the effective cost to Rs. 7345. For B.Sc. (General) courses unit cost works out to Rs. 5346. On an average Rs. 2171 per student are wasted away in this course. This increases effective cost to Rs. 7517. Wastages and effective cost in this course as compared to other courses is the highest.

In sum per unit cost of producing a graduate honours courses is higher for Arts and Humanities. This is followed by Science and Social Sciences. The unit cost is the least for Commerce, Honours course.

However, cost for graduating students in general courses say B.Sc. (General) and B.A. (Pass) is higher than in honours courses. For B.Sc. general courses the per unit cost is the highest.

Size-cost relationship

As in the case of industry it is expected that per unit cost in education is also least at a size where resource input are fully utilized. Accordingly we tried to find out the size (defined in terms of students) of class/course where unit cost is the least. This aspect was examined by the statistical techniques of simple, log and non-linear regression. Although cost was found to be related with the enrolment, yet because of small number of observations and heterogeneity of courses definite conclusion about the size where the cost is the least could not be drawn. However, we have drawn a scatter diagram for Arts, Humanities, Social Sciences and Commerce Honours courses. These courses are homogenous in nature to a great extent. The scatter diagram revealed that cost is higher in the courses where number of enrolment is smaller than 40. The cost decline as the enrolment size increases, exception being courses with 68-70 number of students. This is however again indicative of the nature of curve, than definite answer to the issue under study. Some definite conclusions are expected to be reached with large number of observations.

Table I

Per Credit Hour, Teaching Cost, by Faculties and Subjects 1973-74—76

	1973-74	1974-75	1975-76
Arts/Humanities			
English	136.78	133.59	145.91
Hindi	67.30	80.97	80.29
History	89.32	115.81	103.73
Sanskrit	62.73	36.39	61.97
Philosophy	343.92	267.39	345.05
Average per unit cost	101.08	103.50	109.23
Mathematics & Statistics*	78.42	80.56	92.34
Average per unit cost	78.42	80.56	92.34
Social Sciences			
Economics	75.61	105.19	123.62
Political Science	92.99	123.99	128.86
Sociology	49.77	54.22	88.01
Average per unit cost	77.56	100.38	118.60
Commerce	63.27	129.67	139.32
Average per unit cost	63.27	129.67	139.32
Sciences			
Physics	117.18	138.19	203.29
Chemistry	122.58	124.94	182.18
Botany	23.36	46.76	70.21
Zoology	33.18	34.46	78.71
Average per unit cost	91.31	105.87	160.15
Average per credit hours (All subjects)	88.15	101.68	124.30

*This subject is common for both Arts and Science Faculties.

To sum up :

(a) That model of unit cost estimation covers all the aspects of costs. But due to data problem, the scope of the study is limited to the recurring institutional costs. The problems faced in the process of data collections suggests that there is a need for recasting the budgeting format of the colleges on the lines of functions/activities. Here programming, planning and budgeting system (PPBS) might be helpful.

(b) That per unit institutional cost is higher in B.A. and B.Sc. general courses as compared to honours courses. Institutions need to plan their general courses such that the cost for general courses is reduced.

(c) That per unit institutional cost for Sanskrit and some of the Language (Honours) courses are relatively higher. The costs may be reduced if such courses are organized in collaboration with two or three colleges situated in the closer vicinity.

Table II

Per Unit Cost, By Courses and Subjects, Hindu College 1973-74—76

	Total per unit cost 1973-74	Total per unit cost 1974-75	Total per unit cost 1975-76
B.A. (Hons) Arts/Humanities			
Sanskrit	3608.98	3110.53	3314.59
English	2362.22	2197.32	2603.78
Mathematics & Statistics	*2100.55*	*2150.97*	*2185.12*
Hindi	1721.91	2057.03	2010.94
History	1448.47	1513.37	1645.08
Average per unit cost	1988.25	1890.63	2180.26
Social Sciences			
Political Science	1653.56	1931.99	2173.74
Sociology	1229.64	1728.91	2001.30
Economics	1218.66	1440.13	1685.63
Average per unit cost	1359.24	1660.24	1891.29
B. Com. (Hons)	984.71	1486.76	1580.68
Average per unit cost	984.71	1486.76	1580.68
B. Sc. (Hons)			
Mathematics	2126.50	2879.78	3365.83
Chemistry	1741.65	2268.78	2807.37
Botany	1704.45	1967.92	2197.57
Zoology	1656.22	1765.97	1991.84
Physics	1553.94	1680.86	1877.14
Average per unit cost	1727.20	2180.30	2481.67
B.A. (Pass)	1557.89	2302.39	2647.53
Average per unit cost	1557.89	2302.39	2647.53
B. Sc. (General)			
Group B with Physics	2598.71	2784.58	3676.85
Group B without Physics	2377.79	2379.75	3270.98
Group A	1636.22	2172.22	2719.34
Average per unit cost	1893.13	2270.83	3009.77
Fine Arts			
Music	612.67	316.78	757.68
Average per unit cost	612.66	316.78	757.68
Average per unit cost (All Subjects)	1617.73	1961.83	2257.53

(d) That a good deal of resources are wasted due to failure and drop out. This could be avoided by introducing some kind of counselling and coaching courses for the students. (*See Appendix A*).

(e) That per lecture cost seems to be very high. This is partly because of the fact that the actual numbers of lectures taken are always 20-30% less than prescribed in the time table (*See Appendix B*) Perhaps this cost could be brought down by reducing the gap between actual number of lectures held and the number planned.

(f) Although no clear cut size of class/course is observed where the unit cost is the least, yet the study reveals that classes/courses with enrolment smaller than 40 are uneconomical.

It may be concluded that the analysis suggests that how and where economies can be effected in the use of resources. When one thinks of linking university with the community one thinks in terms of initiating some courses with class-room as well as practical training at the graduate level. The analysis is useful in working out the resource implications for courses that link the university with the community and the environment. ☐

Table III
Per Unit Cost for Three Year Degree Course Wastage And Effective Costs, by Faculties and Subjects
Hindu College 1973-74—76

	Per Unit Cost of Graduating Students	Per unit wastage	Effective Cost of Producing Graduates
Arts/Humanities			
Sanskrit	12358.78	—	12358.78
English	6017.80	782.50	6800.30
Hindi	6293.46	1405.71	7699.17
Mathematics & Statistics	1317.89	1317.89	—
History	4314.17	491.22	4805.39
Average per unit	5814.37	801.62	6615.99
Social Science			
Sociology	3221.66	921.61	4143.27
Political Science	4905.49	760.31	5665.80
Economics	4097.14	737.47	4834.61
Average per unit	4133.61	794.95	4928.56
B. Com (Hons)	3220.55	432.63	3653.18
Average per unit	3220.55	432.63	3653.18
Science (B. Sc. (Hons)			
Mathematics	8191.33	105.74	8297.07
Chemistry	5251.63	592.17	5843.80
Zoology	1656.22	225.85	1882·00
Physics	9190.23	719.20	5909.43
Botany	1704.46	592.17	2296.63
Average per unit	4561.89	452.04	5013.93
B. A. (Pass)	6083.5	1261.58	7345.15
Average per unit	6083.57	1261.58	7345.15
B. Sc. (General)			
Group B with Physics	2598.71	—	2598.71
Group B without Physics	7880.42	—	7880.42
Group A	5705.78	2171.04	7876.82
Average per unit	5346.17	2171.04	7517.21
Average per unit	4771.81	706.37	5078.18

There was only one student and he failed

Appendix-A

Percentage of students failed/droppedout to total students admitted, by courses & subjects
Hindu College 1973-74—76

Course	Dropout within 3 months %	Failed/ droppedout at end of the course %
B. Sc. (Hons)		
Physics	28.57	36.36
Chemistry	24.19	54.34
Zoology	4.34	13.63
Botany	4.76	5.00
Mathematics	25.00	5.88
	21.24	30.87
B. Sc. (General)		
Group A	25.00	63.63
Group B without physics	5.26	—
Group B with physics	4.76	—
	16.30	35.71
B. Com. (Hons)	12.00	37.20
B.A. (Pass)	3.44	88.46
B.A. (Hons.) Arts/Humanities		—
Sanskrit	20.00	
English	20.68	34.78
Mathematics & Statistics	—	—
Hindi	25.00	58.82
History	7.69	30.43
	17.44	38.23
Social Sciences		
Political Science	13.33	40.00
Sociology	7.69	65.00
Economics	31.81	48.27
	20.00	50.00
All Subjects	17.75	40.50

Appendix-B

Percentage of lectures held to total lectures planned by courses and subjects
Hindu College, 1973-74—76

	1973-74	1974-75	1975-76
B.A. (Hons)			
Economics	60.43	62.32	60.77
English	67.41	69 56	63.62
Mathematics	55.64	43.04	35.79
Sociology	53.75	68.86	77.28
Pol. Sc.	74.56	73.59	82.11
History	56.22	54.21	59.48
Sanskrit	62.73	72.98	83.90
B. Sc. (Hons)			
Botany	171.42	76.35	62.06
Chemistry	57.89	70.16	59.90
Mathematics	55.64	63.91	59.63
Physics	66.66	72.89	61.30
Zoology	166.50	101.97	83.25
B.A. (Pass)			
History	68.67	79.59	77.87
English	53.83	66.47	60.91
Political Sc.	63.50	66.37	77.01
Hindi	46.93	50.76	41.57
Economics	52.95	59.35	54.67
Philosophy	39.08	60.15	53.64
B.Sc. (Gen) Group A			
Physics	51.97	73.15	75.61
Chemistry	79.55	96.30	78.57
Mathematics	50.17	46.55	62.24
All Cour	63.21	65.14	62.41

Need for national perspective to higher education

The universities naturally reflect the characteristics of the social systems of which they are a part. Bombay University is no exception. Being a city university, it reflects more sharply the stresses and strains of life in a large industrial city. These tensions, in the present phase, are not the inherent weakness of an industrial society; nor are they the usual conflicts between value systems that one normally associates with the consequences of development. Our problems, in fact, are those of removing the obstacles on our road to social and economic development. And these obstacles are poverty, ignorance and glaring inequalities in our society. Can we not capture some of those sparks which fired the leaders of our freedom movement to wage a war against these obstacles to our development? Can our universities not produce a generation of men and women who can take on the task of leading our social and economic development, just as they did earlier in giving the leadership to political freedom? If the freedom movement was a relentless fight against a mighty colonial empire, what we need today is an equally determined effort to reform ourselves, an effort inspired by convictions and a vision of our future. Naturally, one looks up to universities to provide the leadership in this effort.

Are our Universities today in a position to inspire such confidence? Can they claim with pride that they are the natural leaders in our efforts to bring about social and economic change in the country? I do hope that the University community throughout the country will do a good deal of introspection on this matter. While I would not like to anticipate the outcome of their soul-searching or suggest any solutions to overcome the present crisis of confidence, I would like to share some of my concerns with you. There have been situations of disquiet and unrest in many campuses in our country as well as those abroad. Most of them were associated with major political upheavals and convulsions, against domestic or foreign tyrannies. There have also been instances, particularly in the developed countries, where such upheavals were the direct consequences of a crisis in the value systems which development itself fostered. In both cases, when stability followed political convulsions, or the quest for moral and spiritual values found one outlet or the other, normalcy and quiet returned to the campuses. But is it true in our case?

I would like to think that the glorification of the campus unrest in the developed societies has had a disastrous consequence for us. The university students are impressionable, articulate, idealistic and dynamic. But all these virtues, most unfortunately for us, add up to a fury that only consumes, and does not create. If we can correct the situation, I am sure, we would go a long way. Our goals of economic and social development are far from fulfilled and in any case we have not reached a stage where it could be said that a crisis in the value system has overtaken the younger generation. Then what are our ills due to? The important cause, to my mind, is the fact that we have not been able to provide a truly national perspective to our higher education. Combined with our readiness to accept uncritically certain elements that lend glamour and glory to our academic pursuits, we find ourselves in a situation in which concerns about who gets education, and what education he gets, are practically relegated to the background. Basically, these are matters for reforms within the university system and not prescriptions for any external agency to lay down.

It would appear to any superficial observer of the educational scene in India that during the last two years or so our universities have been arenas of turmoil, chaos and disorder. There are reports, almost everyday though some of them are exaggerated, which leave one with the impression that most of our universities remain closed for long periods in the year. I have had a study made of this subject and I find that between January and December, 1978, there were disruptions in the normal functioning of about 30 universities in the country. They were affected for periods, in some cases, of 2-3 days; in some other cases, for as long as 2-3 months. But what was more revealing, and what should really cause us concern, are the immediate reasons for these incidents. Most of these in my view are such as could be solved within the system itself. In fact, we had taken up these questions several times with the State Governments, the Chief Ministers, the Governors of States who are Chancellors of the universities and also with the leaders of major political parties in the country. I am sure that with greater understanding and cooperation of all concerned, most of these problems can be solved, though I must confess that solutions to the larger social problems can be found only through rapid economic development.

Having said this, I must also mention that the university community itself should assume a more positive role in finding appropriate solutions to their problems. It is often emphasised that the sanctity of the campuses should be guarded, autonomy of the universities should be preserved and that there should be no interference by any external agency in their affairs. I am second to none in the conviction that university autonomy should be jealously preserved and that the campuses are sacred. But I would like to remind you that this concern for sancitity and autonomy is relevant as much to those within the universities, as to those outside. Who is to blame if desecration takes place inside? What have we done to ensure that this does not happen in our campuses? We have teachers' organisations in the country—far too many, perhaps, more than what we need! Regrettably, they are mainly preoccupied with promotion of sectional interests, some of which come in conflict with others. Have we ever considered it seriously that the teaching community should assume the moral and intellectual leadership in society, provide a truly national perspective and sense of purpose to our education and make it a powerful and dynamic instrument for bringing about social change and rapid economic development and for laying the foundation of a great nation? If our teaching community fails to do so, and the younger generation turned out of our educational institutions does not acquire a social purpose and a vision of the future, I must confess that we cannot accept that our universities are well with the nation. Many instances that we notice around us, whether of the use of fire-arms in the hostels or mass-copying at examinations, can effectively be eliminated if the teachers provide the right moral and intellectual leadership. If students have to be dealt with firmly and decisively, teachers have to enjoy moral authority not only among students but also in the society.

The opportunities available to provide this leadership are indeed greater today. The system already produces the manpower needed for our economic and industrial development, though there are disparities between strata of society and regions. We are now in a position to correct these imbalances, without any serious dislocation in the supply of trained manpower. We only need to concentrate our efforts for a period of time to reforming the system and providing a mass base to our educational efforts, to ensuring that the benefits of education reach all the sections of our population and to all regions and areas in as equitable a manner as possible. Even after 30 years of Independence, we are still far from fulfilling the constitutional objectives of providing elementary education upto the age of 14 for all children. The problem of dropouts needs the attention of educationists who should identify the socio-economic factors that come in the way of our progress in ensuring universal elementary education and to find out proper remedies and solutions. We have decided to attach greater priority to primary education; this is reflected in the larger allocation made for it in the present Plan.

The two basic problems that we face are poverty and illiteracy. Indeed they are two aspects of the same problems and the struggle to overcome one without at the same time waging a fight against the other is bound to result in aberrations and disappointments. The exclusion of a vast majority of the people from the process of education has been one of the major concerns of the present Government. While determined efforts must be made to universalise elementary education upto the age of 14 years, educational facilities have to be extended to adult population also to make good their educational deprivation and to enable them to develop their potentiality. Indeed, universalisation of elementary education and adult literacy are complementary to each other.

The efforts to provide education to illiterate adults, especially those below the age of 35, will not only enable them to develop their own potentiality, but also through an appropriate exposure to the benefits of education ensure that the children in their homes are not withdrawn at too early a stage. The National Adult Education Programme launched in October last year lays special emphasis on the imparting of literacy and skills relevant to life. It has to cater specially for the economically and socially deprived sections of society. Many amongt them have grown up in a culturally rich environment where learning has been through the spoken world transmitted from generation to generation. The programme must, therefore, respond to their cultural and intellectual environment and build upon their innate artistic perceptions and skills in craft.

I mention these two areas of education in the context of the reforms in our educational system. These reforms are neither possible nor effective without the whole academic community participating in them for their successful implementation. It is here that the people at large would look to you for leadership and initiative. It is through such initiative and involvement that you will influence, and in turn be influenced by the community around you. And this, in the ultimate analysis, is the real objective of the University.

These are not easy tasks. Doubts are expressed that the importance and priority given to elementary and adult education are the results of some misplaced enthusiasm. A view is also held, among the academic community, that these two sectors of education are being given greater attention than the needs of higher education. I have tried to explain, in some detail how these misconceptions have developed. It requires no great insight to understand that the superstructure of higher education cannot subsist unless it is deeply rooted in our soil. What is more important, if our higher education has to acquire a greater purpose and content, it has to serve the needs of the entire society, and not merely the elitist sections. It does no damage to higher education if we widen its base and attract students from all sections of our population.

[Excerpts from the convocation address delivered by Dr. P.C. Chunder, Union Minister for Education and S.W. at the University of Bombay.]

CAMPUS NEWS

Seminar on technology transfer

In his key note address at the seminar on 'Transfer of technology to rural areas' at the College of Engineering, Osmania University, Dr. N. Shanmukha Rao, Vice-Chancellor of Jawaharlal Nehru Technological University stressed the need for development of appropriate technology for rural areas by university research laboratories. He called on engineering institutions and universities to fill the gap of skilled technical manpower to look after the maintenance of agricultural equipment. He suggested introduction of short-term technical courses for teachers who could man vocational institutions at the intermediate level. The junior colleges in mofussil areas could run short term courses for imparting basic knowledge for maintenance of machinery used in rural areas. This will remove curbs on productivity of agriculturalists, who were affected in the absence of prompt repair services. University students could play their role through National Service Scheme by training villagers in equipment maintenance. Dr. Shanmukha Rao called for coordination of work of the various agencies involved in rural uplift to avoid wastage of efforts and resources.

Prof. G. Ram Reddy, Vice-Chancellor of Osmania University said that an extension cell for dissemination of appropriate technology and social science concepts to develop rural areas will be opened at the University. The research cell in rural development will be established with the assistance obtained from other sources.

Prof. V.V. Subba Rao, Head of the Mechanical Engineering Department at the university said that the seminar was arranged as part of the diamond jubilee celebrations of the university. The main object was to examine the influence of the efforts put in by various developmental agencies engaged in the field of rural development. The seminar provided an important forum for exchange of views among technologists, officials, students, non-students and youth.

BITS modifies programmes to receive 10+2 products

With the introduction of 10+2 scheme in the schools and the fact that a large bulk of input to BITS from July 1979 will be from this system, BITS has taken a comprehensive decision regarding accommodating such inputs. It will be recalled that AICTE and other professional apex bodies had recommended an appropriate examination to these products to determine whether the duration of the first degree in the professional subjects would be 4 years or 5 years. In view of the insufficient information about the preparedness of the 10+2 product in terms of their own syllabi, BITS, being an all-India institution, has decided that after admission every student will be given a test based upon the first three basic courses of the Institute namely Physics, Chemistry and Mathematics in our existing five-year integrated programmes. It is proposed that through certain operations a student's achievement in these courses would be tested. This is exactly the AICTE decision in respect of engineering and BITS has extended this concept to all its first degrees. A student is allowed to proceed upwards only if a minimum level of achievement has been secured by him at the test, failing that, through a preparatory year of courses which will be the above named courses. In the case of English on the other hand, while the test will determine his preparedness, the student will however be allowed to reach the first year of the programme and later within a prescribed time make up for the deficiency in English.

Beyond the preparatory year the programme consists of 4 years that is eight semesters including the usual option af practice school or thesis. As of now the first degrees at the Institute are: B.E. (Hons.) Civil, Chemical, Electrical and Electronics, Mechanical; M.Sc. (Hons.) Biological Sciences, Chemistry, Economics, Mathematics, Physics; B. Pharm. (Hons.); M.Sc. (Tech.) Computer Science, Instrumentation, Science and Technology Development, Museum Studies; M.M.S.; M.A. (Hons.) English, M.A. (Hons.) General Studies.

In the design of these programmes many flexibilities which have been operated by the Institute for the past several years like the dual degree scheme, transfer etc. have particularly assumed a new significance. For example, under the dual degree scheme priorities have been worked out and the first priority will be given to students who enter one of the M.Sc. (Hons.) programmes to work for a second degree in any of the B.E. (Hons.) programmes, B.Pharm (Hons.), M.M.S., M.Sc. (Tech.) Computer Science, M-Sc. (Tech.) Instrumentation. The requirements for dual degree are the compulsory courses of each of the two programmes plus a specified number of electives. Under the new design it is possible for the Institute to accommodate every aspirant from the M.Sc. (Hons.) programmes to work under the dual degree scheme as stated above. As per practice the dual degree will be assigned on the basis of performance and preferences of the competing students.

Economics as a Science Degree—M.Sc. (Hons.) Economics

With the experience of the last eight years and the modifications made in the Economics programme particularly in response to the students' experience at the BITS practice school stations, the contents of the economics programme have been considerably upgraded and from July 1979 the degree is named as 'M.Sc. (Hons) Economics'. In addition to the economics content, the programme has the strong base of Mathematics and Science as imparted to the science students. In addition there is a category called Analysis and Application Oriented Courses (AAOC) which is available for the other degree programmes also as listed above and this category contains courses like probability and statistics, Social Engineering, Optimization, Data Processing, Operations Research, Systems etc.

This change over of the degree from M.A. (Hons.) Economics to M.Sc. (Hons.) Economics was welcomed by the Indian Economics Association through its Secretary.

M.A. (Hons.) General Studies

A new programme under the M.A. (Hons.) degree in General Studies has been introduced. It is felt that a basic training in both humanities and social sciences at one end and scientific studies at the other will prepare a candidate for new opportunities such as those envisaged by the UPSC in its recent requirements for Civil service examinations and also new opportunities which would be available for candidates who can combine in their university studies the two broad streams, the so-called two cultures, namely humanities and scientific studies.

Individual students have been provided opportunity to take science courses either of the type requiring high dependence on mathematics and analysis or science courses which are more narrative and integrated at the conceptual plane. In addition there are categories like technical arts, technique oriented courses, humanities and social sciences, music and fine arts, courses on development process and a certain number of electives. This programme has also the alternative component of practice school or thesis. The student is also provided with an opportunity to do a dual degree in one of the other three progammes namely, M.A. (Hons.) English, M.Sc. (Tech.) Science and Technology Development, M.Sc. (Tech.) Museum Studies.

Punjabi Varsity organises regional history conference

Dr. M.S. Randhawa, former Vice-Chancellor of the Punjab Agricultural University inaugurated the thirteenth session of the Punjab History Conference recently at Punjabi University, Patiala. He stressed the need for study of history of the people, their social life, and their struggle in life. The archeological finds, paintings and fossils could help in tracing the history of mankind. Dr. Randhawa said that history of agriculture could not be taken in a narrow sense as it involved the evolution of man. The fossils and archeological preservations in Silaspur, Kangra and Gular regions in northern part of the country resemble the conditions of man's evolution in East Africa. The northern region of the country was therefore important to study the history of man. The man from the very beginning had been engaged in discovering and controlling the solar energy and was constantly progressing in this direction. The study of agriculture was perhaps the synoptic history of man.

Dr. Ganda Singh, general president of the session in his address pleaded for establishment of reference sections in the university libraries for preservations and study of rare books and old manuscripts. He said Punjab was full of places of historical interest. The scholars could bring to light the history of these places for the benefit of present and future generations. The publications of local history would serve as a source material for comprehensive works,

Dr. Amrik Singh, Vice-Chancellor of the university welcomed the delegates and said that a separate library in the campus would preserve the rare books donated by Dr. Ganda Singh. The copyright of all these books had been provided to the university.

Rajasthan Varsity designs physics equipment

One of the educational equipment fabricated and designed at the Centre for Development of Physics Education in Rajasthan University has been adjudged first in the competition organised by the American Association of Physics Teachers. The apparatus were sent for the competition from the different centres of advanced studies of the world. The Rajasthan University Centre had initially developed eight units after performing different experiments. Sixty simple instruments were designed and fabricated to help students understand physics with more perception and to enable them to contribute towards growth of knowledge in physics. Prof. Babu Lal Saraf of the Physics Department said that these apparatus were being used for regular teaching programmes, by various colleges in Rajasthan and other places outside the state. The Indian Institute of Technology, Delhi, Sardar Patel University and some other institutions of higher learning have obtained the equipment against payment to cover the cost on fabrication which has also initiated a large scale interaction. The equipment is original in form and instructive for the learner. The University of Rajasthan has also initiated another project on science education to impart knowledge in an informal way. Methods of giving instructions to the students at different levels including writing of books with graphical language which cut across the barrier of language have been developed at the university centres. A museum on science education is also being developed for permanent and mobile instructions. The studies which now cover physical sciences will be extended to life sciences in a phased manner.

New projects at Osmania Varsity

The Senate of the Osmania University at its recent meeting approved payment of remuneration to examiners according to the guidelines issued by the University Grants Commission. The university senate approved the budget estimates for the next financial year with total outlay of Rs. 551.76 lakhs. A substantial amount has been allotted in the budget for development of sports. The budget has an allocation of Rs. 178.55 lakhs to be provided by the University Grants Commission for procurement of books, equipment and fellowships. Specialised and sophisticated equipment will be purchased during the year for development of service facilities at the instrumentation centre of the university. The University Grants Commission will also provide assistance for institution of two-year full time MBA course. The University has collected Rs. 52 lakhs for the diamond jubilee programme. The programme for the jubilee year includes establishment of a research cell in the field of rural development, additional chairs in some of the existing disciplines and expansion in new areas of learning.

The University will undertake for the first-time computerisation of B.A. and B.Com. results to enable the candidates to apply for other courses in time.

Research institute in printing technology

Inaugurating the golden jubilee celebrations of the Institute of Printing Technology in Madras recently, Shri C. Aranganayagam, Tamil Nadu Education Minister stressed the need for close liaison between technical institutions and industrial establishments to ensure integrated development. Mr. S. Vaiyapuri, State Director of Technical Education said a research institute in printing technology will soon be established in the campus of the Printing Institute. The Institute of Printing will offer new technology for production of books needed for the massive programme of adult education.

Prof. G.R. Damodaran, Vice-Chancellor of Madras University released the commemoration volume on the occasion.

Plea for common examination in varsities

Dr. Ganpati Chandra Gupt, Vice-Chancellor of the Himachal Pradesh University said recently in Simla that the present education system was three hundred years old and needed a change to suit our environment/needs. He advocated adoption of a common syllabus by the universities in the region and establishment of a Regional Examination Board for conducting various examinations. This would help in standardisation of education and solve the difficulties in the distribution of text books. He suggested that instead of holding one annual examination it would be better to organise examinations every alternate month leaving the students free to appear in any of the examinations during the year. The Vice-Chancellor said that system of spot evaluation of answer books had been introduced at the university to facilitate the work of declaration of results. The Directorate of Correspondence Courses at the university has been activized to expedite lessons to students according to schedule. A complaint cell has also been set up in the university. Rules for admission to M.Phil courses have been modified for the benefit of students with fifty to fifty-five per cent marks to be eligible for the course. These students would however be required to improve their percentage of marks in M.A. examination as well. Dr. Gupt emphasised the need for democratic reforms in the university administration.

NS NIS to conduct certificate course in sports

The Netaji Subhash National Institute of Sports, Patiala will conduct a six-week certificate course on sports at its four centres from May 7 to June 16 this year. The courses will be conducted in seventeen games besides athletics. The games do not include women's cricket and chess. The institute at its headquarters in Patiala will impart training in football, handball, judo, swimming, kabaddi, kho-kho and yoga. The courses in other games will be conducted at NIS Centre, Delhi, Laxmibai National College of Physical Education, Gwalior and NIS Centre, Bangalore.

Seminar on groundwater exploration

The seminar on Geohydrological and groundwater exploration held recently in Visakhapatnam under the auspices of the University Grants Commission has recommended the creation of a centralised agency for collecting and preserving information on hydrological sciences. Stress was laid on weekly water balance computations for benefit of the farmer. Prof. V.V.J. Sharma of Andhra University emphasised the need for water quality studies. He said that ground water quality analysis of Visakhapatnam would be helpful in determining the availability of important minerals in the region.

The seminar was co-sponsored by the Geological Survey of India, Andhra Pradesh Irrigation and Development Corporation, Association of Exploration Geophysicists and Andhra Pradesh Academy of Sciences. Participants to the seminar included delegates from central and state governments institutions and various universities.

Seminar on problem of state autonomy

Dr. Vikas Mishra, Vice-Chancellor of Kurukshetra University inaugurated recently the seminar on the problem of state autonomy and its emerging trends organised by the Department of Political Science of the University. He said political scientists should examine the question of centre-state relations in the context of present situation in the country. He said the balance between the centre and the state was very delicate and any attempt to change it will create disequilibrium.

Dr. D.C. Verma, former Vice-Chancellor of the University said that if we wanted our democratic system to thrive, we should not neglect the functioning of institutions at grassroot level. He stressed the need for a workable balance between the forces of centralisation and decentralisation.

Dr. V.S. Budhraj, Head of the Department of Political Science of the University said that there had been a growing demand for additional powers to the states which should be considered in the context of national unity. He made a plea for establishment of an egalitarian society to achieve a harmonious balance between national integration and state autonomy.

About thirty political scientists from the various universities participated in the seminar sponsored by the University Grants Commission.

Plea for improvement in teaching methods

Delivering the presidential address at the twentieth anniversary of the Indian Institute of Technology, Bombay, Dr. H.N. Sethna, Chairman of the Atomic Energy Commission called for a constant effort in improving and *updating the methods of teaching* in technological and engineering institutions. The education imparted in such institutions should suit the industrial development in our country. Dr. Sethna paid tributes to the IIT for its contribution in the field of technology and science. He said that with the help of Soviet scientists, the Institute would give a new approach to education system and maintain the pace of advancement in the ensuing decades.

Seminar on journalism education

The Department of Journalism of Banaras Hindu University organised recently a two-day seminar on the second Press Commission with special reference to journalism education in India. The seminar has stressed the need for coordination of academic programmes relating to journalistic training with agencies of mass communication. The formation of a National Council for Journalism and Mass Communication has been suggested to train students for job-oriented courses. It was felt that in-service training programmes for journalists should be encouraged and a fair amount of obligation may be placed on newspapers to absorb them after their studies. The government agencies and public sector undertakings should formulate such a policy that jobs in the field of journalism and public relations are offered to the trained journalists. The seminar favoured uniformity in journalism courses in universities which should be of two years duration. The problems of provision of textbooks and equipment of mass media to students to make their courses practical and useful were also debated in detail.

Dr. Hari Narain, Vice-Chancellor of the University inaugurated the seminar and Prof. P.N. Malhotra former Director of Mass Communication presided. The delegates included representatives from Newspapers, Press Commission and University Centres.

UAS plans novel animal home

The novel animal shelter-cum-*rescue home of the Society for* prevention of cruelty to animals was inaugurated recently by Karnataka Chief Minister, Shri Devaraj Urs at the University of Agricultural Sciences, Bangalore. The animal home would have adequate facilities to maintain initially one hundred fifty stray, wounded and pet animals. It will also have separate blocks for big animals, small animals and administrative buildings with facilities for examination of animals by doctors and an operation room. Medical facilities at the home would be provided by the doctors attached to the university veterinary hospital. The university will also put up a separate veterinary hospital in other compuses.

Dr. H.R. Arakeri, Vice-Chancellor of the University while speaking on the usefulness of animals, appealed for the immediate provision of additional clinical facilities for the veterinary college.

Madras Varsity decision on 12-year courses

The University of Madras has issued an ordinance to recognise as equivalent the 12-year courses leading to XII standard examination conducted by the Central Board of Secondary Education, Council for the Indian Schools Certificate Examination and the Tamil Nadu Board of Higher Secondary Education. The ordinance provides that all other candidates who have taken any examination conducted by the state government, university or statutory board under the 10+2 pattern and after twelve years of study with not less than five subjects including English shall be eligible to join the first year of the degree course. Candidates applying for admission to professional courses including medicine, engineering and technology should have studied the subjects relevant to such course and should satisfy the admission requirements.

New courses at Madras Varsity

The Senate of the Madras University at its recent meeting approved the introduction of postgraduate certificate course in 'Effective Communication' and a diploma course in 'School Management'. The meeting of the Senate was presided over by the Vice-Chancellor, Shri G.R. Damodaran.

A syndicate member, Mrs. P. Devadoss, while summarising the salient features of the annual report of the university hoped that the university and the Directorate of Collegiate Education would give weightage for the time spent on community services for purposes of calculation of teaching load.

Sports coaching for Varsities students

The Association of Indian Universities has selected about 390 sportsmen/sportswomen from university centres all over the country for the next summer coaching-cum-competition programmes. The programme will be conducted for twenty-two days followed by competition among the zonal teams. The camps in football and athletics are being organised as a part of the training programme of the Indian Universities Contingent proposed to be selected for participation in the next world university games scheduled to be held in Mexico in September. The games included in this year's calendar are: athletics; football; hockey; volleyball; basketball and wrestling.

TIFR experiments on Astronomy

The Tata Institute of Fundamental Research in collaboration with the Indian Space Research Organisation and the Inter-Cosmos of the Soviet Union are conducting balloon experiments in Hyderabad for high energy gamma rays studies. These experiments are of fundamental nature and would help scientists in studies relating to the meteorological, and the sun-earth relations.

Shri R.T. Redkar, incharge of the project said that important scientific data had been obtained from experiments conducted earlier. The aim of the joint project was investigations on the properties of astronomical objects. The balloon studies were being conducted all over the world to compare the data as transmitted through satellites. It was felt that experiments would help formulate the bases for satellite experiments.

Marathi chair for Karnatak Varsity

Shri S.S. Wodeyar, Vice-Chancellor of Karnatak University, disclosed recently in Dharwar that the state government had sanctioned a study chair in Marathi in the university. The Maharashtra Government had also sanctioned a study chair in Kannada at Bombay University. The Vice-Chancellor emphasised the role of languages in fostering national unity and integration. There was much in common between Kannada and Marathi and the harmonious relations between these languages would be further strengthened with a greater exchange of thoughts between the people of the states.

PG complex of Dakshina Bharat Hindi Prachar Sabha

Speaking at the inaugural function of the new building of the Dakshina Bharat Hindi Prachar Sabha in Hyderabad, the Secretary Shri V. Radhakrishnamurty said that out of the sixty thousand candidates who had appeared for the different examinations conducted by the Sabha, forty thousand were women candidates. The Sabha had three colleges and twenty-eight schools imparting education upto Visharad level. He said the government had given their clearance recently to introduce postgraduate classes leading to M.A. and Ph.D. degrees. The postgraduate complex of the Sabha would start conducting classes soon. The syllabus of the post-graduate classes would cover studies on classical and modern Hindi literature and other papers to help students acquire functional language competence in the field of commerce, law, science and administration.

NS NIS sports complex at Calcutta

Shri Jyoti Basu, West Bengal Chief Minister visited recently the proposed site for the sports complex of the eastern wing of the NS National Institute of Sports in Salt Lake in Calcutta. The Chief Minister was shown the blue-print of the complex which included the football ground around which a 400-metre cinder-track will be laid for coaching of athletes, a hockey field, a covered gymnasium in the style of Khudiram Indoor Stadium and courts for basketball, volleyball, kabaddi and kho-kho. The work on the complex will start immediately and the football ground is expected to be completed for the trainees by June this year.

Indore Varsity organises summer institute in education

The Department of Education of Indore University organised during the current academic session a summer institute on the pedagogy of higher education for the benefit of college teachers. The summer institute was organised mainly to help the teachers of various disciplines to interact on common problems for the qualitative improvement of higher education. It highlighted the neglected area of pedagogy at the higher education level. Techniques of organisation of courses, methodology of teaching, psychological problems involved in the teaching and handling of students at the higher education level were some of the main problems discussed at the Institute. The Institute made the following recommendations:

- *Professional in-service training/orientation courses in different areas should be organised frequently for college and university teachers.*
- The duration of such courses should be normally six weeks. Completion of three such successive courses of 200 hours each should lead to award of a degree in bachelor of higher education.
- Teachers desirous of attending such courses should be granted duty leave.
- Evening courses should also be organised for benefit of college teachers.

Summer institutes in agricultural sciences

The Indian Council of Agricultural Research will hold twenty-six summer institutes including five short term institutes during the summer vacation of 1979 in the field of agriculture, animal husbandry and home science subjects for the benefit of teachers, research workers and extension specialists. The objective of the in-service training would be to provide necessary orientation to teachers so that they could relate their experience to practical problems. Applications on the prescribed forms will be entertained direct by the Director of the summer institutes. The institutes will be conducted at Punjab Agricultural University; University of Agricultural Sciences, Bangalore; Haryana Agricultural University; Tamil Nadu Agricultural University; Indian Agricultural Research Institute; G.B. Pant University of Agriculture & Technology, Pantnagar; Ranchi University; Andhra Pradesh Agricultural University; Mysore University and other research centres.

THE UNIVERSITY OF BURDWAN

RAJBATI BURDWAN
WEST BENGAL

Advertisement No. 14/78-79
Dated, April 5, 1979

Applications in the prescribed form are invited for the following posts in the approved scales of pay (viz. Professor—Rs. 1500-60-1800-100-2000-125/2-2500/-, Reader--Rs. 1200-50-1300-60-1900/- and Lecturer - Rs. *700-40-1100-50-*1600/-) with allowances and other benefits according to University Rules.

A. Department of Mathematics
- (i) Professor of Statistics—One post
- (ii) Reader in Statistics –One post

B. Department of Bengali
Lecturer—One post

C. Department of Physics
Lecturer—One post

D. Department of Commerce
Lecturer—One post

E. Department of Philosophy
Lecturer—One post

MINIMUM QUALIFICATIONS

1. (a) A Doctor's Degree or published research work of an equally high standard, and
   (b) Consistently good academic record with first or high Second Class (B in the seven point scale) Master's Degree in the relevant subjects or an equivalent degree of a foreign University. For the post mentioned in E, persons holding Master's Degree in allied discipline also are eligible to apply.

2. **Additional Requirements**

For Professorship
- (i) At least ten years' teaching experience in Post-Graduate Class;
- (*ii*) Competence to plan and supervise Research Project;
- (*iii*) Publication of sufficient merit.

Desirable Qualification : Specialisation or Proficiency

For A (*i*) & (*ii*) : Mathematical Statistics/Multivariate Analysis/Econometrics/Industrial Statistics/Bio-Statistics.
For B : Bengali Linguistics
For C : Solid State Physics
For D : Industrial Relations and personnel Management
For E : Indian Philosophy (Vedanta).

The University Council may on recommendations of the appropriate Selection Committee, waive any of the requirements in view of the candidate's specialised knowledge in the subject. The choice of the Committee may not necessarily be confined to those who apply formally.

For application form and other information apply to the Registrar with a self-addressed stamped (0.40p.) envelope (9" x 4").

Last date *for submission of applica*tion with requisite fee of Rs. 5/- is **25 April, 1979.**

A.K. Chaudhuri
REGISTRAR

Indian School of Mines
Dhanbad-826004

No. 615135/79 **Dated: 19-3-1979**

Admission to Post-Graduate Programmes 1979-80

1. Applications are invited from candidates possessing requisite qualifications for admission to the following Post-graduate Programmes being offered, or likely to be offered, at the Indian School *of Mines, which is deemed to be University under the University* Grants Commission Act:

	Programme—being offered unless otherwise stated	Department
I.	CISM/DISM/M Tech (Industrial Engg and Management) (Oriented towards mineral industries) —See Note B	Deptt of Ind Engg and Management
II.	One-year M Tech (Mineral Exploration)	Deptt of Applied Geology
III.	One-year M Tech (Engg Geology)	-do-
IV.	One-year M Tech (Mining Geophysics)	Deptt of Applied Geophysics
V.	One-year M Tech (Petroleum Exploration) —See Note A	Likely to be offered by Deptts of Appl Geophysics and/or Pet Engg
VI.	DISM/M Tech (Mineral Engg)	Deptt of Chemistry, Fuel & Metallurgy
VII.	DISM/M Tech (Fuel Engg)	-do-
VIII.	DISM/M Tech (Drilling Engg)	Deptt of Engg & Min Machinery
IX.	DISM/M Tech (Mining Machinery)	-do-
X.	*Three year part-time M Tech* programme in Mining Mach (Evening version of IX)	*-do-*
XI.	DISM/M Tech (Mining Engg) (Specialisations offered: Mine Planning and Design/Rock Mechanics/Mine Environment)	Deptt of Min Engg
XII.	Two-year Industry-oriented M Tech programme in Opencast Mining	-do-
XIII.	Three-year part-time M Tech programme in Mining Engg (Evening Version of X)	-do-

Note A: Programme V is a new one likely to be started this year.

Note B: *Programme No. 1 consists of three terms of course work,* each of 12-week duration. A student successfully completing any one of the three terms would be awarded the post-graduate Certificate of CISM. A student completing any *two terms, with additional guided project work of 4-month* duration, would be awarded the postgraduate Diploma of DISM, while a student completing all the three terms with guided research work for one-year would be awarded the M Tech degree in Industrial Engg and Management.

Note C: Programme Nos. VI, VII, VIII, IX and XI consist of one-year of course work, successful completion of which leads to the grant of the postgraduate DISM Diploma. Candidates desirous of working for the M Tech degree are required to put in an additional year on project work.

2.1 Eligibility requirements for the different programmes are given below:

I. **CISM/DISM/M Tech (Industrial Engg)**: A degree or equivalent in any discipline of Engg with at least 6 months training *in the industry.*

II. **MTech (Mineral Exploration)**: MSc degree or equivalent degree in Applied Geology.

III. **MTech in (Engg Geology)**: *MSc degree or equivalent in* Applied Geology or Bachelor's degree in Civil Engg.

IV. **MTech Mining (Geophysics)**: M Sc degree or equivalent in Geophysics or Applied Geophysics.

V. **MTech (Petroleum Exploration)**: MSc degree or equivalent in Geology (Preference will be given to candidates who have specialisation in Petroleum Geology/Sedimentology/Stratigraphy and Palaeontology, OR at least one year's field experience in Petroleum Exploration).

VI. **DISM/M Tech (Mineral Engg)**: A degree in Chem/Min/Mech *Met/Elec Engg, or M Sc in Ore Dressing, or equivalent.*

VII. **DISM/M Tech (Fuel Engg)**: A degree in Fuel/Chem/Pet/Min/Met/Mech/Elec Engg, or equivalent.

VIII. **DISM/M Tech (Drilling Engg)**: A degree in Mech/Min Machinery/Min/Automobile/Production Engg, or equivalent.

IX/X. **DISM/M Tech (Mining Machinery)**: A degree in Mech/Min/Elec/Electronics Engg, or equivalent.

XI/XIII. **MTech (Mining Engg)**: A degree in Mining Engg or equivalent.

XII. **MTech (Opencast Mining)**: A degree in Min/Civil/Elec/Mech Engg, or M Sc in Applied Geology or equivalent. Non-Mining candidates should have one-year approved experience in Opencast Mines.

2.2 In each case, a candidate should have obtained atleast 60% marks in qualifying examination relaxable to 50% for sponsored candidates and for those with field/research experience or special aptitute for research.

2.3 Candidates may be required to undergo such test/interview as may be prescribed.

2.4 6-10 candidates may be admitted to each course, according to demand. 20% of the seats are reserved for SC/ST candidates.

3.1 Preference will be given to sponsored candidates. (Sponsorship in this context means retention of lien on post and grant of suitable allowance). Application of sponsored candidates should carry suitable endorsement by the employer.

3.2 **Scholarships**: Unsponsored students are eligible for a scholarship of Rs. 400/- p.m. provided that they have at least 60% marks (55% in case of SC/ST candidates) in the qualifying examination.

4.1 **Procedure for applying**: Application forms along with particulars can be obtained by sending a Crossed Postal Order Draft Bank for Rs 5/- (Rupees Five only) made payable to the Registrar, Indian School of Mines, Dhanbad-826004.

4.2 ***Last Date for Receipt of the Completed Application is* May 30, 1979.**

S.P. VARMA
REGISTRAR

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

P.O. I.I.T., POWAI, BOMBAY-400076

Advertisement No. 966/79

Applications on plain paper are invited from the citizens of India for filling up the following posts in the Institute. Persons employed in the Govt./Semi. Govt. Organisation or Educational *Institution must apply through the* Employer. Preference will be given to the candidates belonging to Scheduled Caste/Scheduled Tribes Community and Ex-servicemen. Age preferably below 30 years. The posts carry allowances such as D.A., H.R.A. and C.C.A. etc. *as per the rules of the Institute* (as admissible to Central Govt. employees stationed at Bombay).

POSTS

1. **Foreman** (For Industrial Design Centre)

Scale of Pay : Rs. 550-25-750-EB-30-900 Plus usual allowances as admissible under the Rules.

Qualifications & Experience : Diploma in Mechanical/Electrical Engineering with 7 years workshop experience.

OR

Regular apprenticeship for 4 to 5 years in Industrial Establishment of repute and 7 years *experience in industrial establishment.* Ability to prepare time estimates for jobs and organize and control labour. Experience in Machine maintenance and familiarity with metals like plastic, wood, metal desirable.

If a candidate has less experience (minimum 2 to 3 years) than what is stipulated above, he may be considered for a Junior Post of "Workshop Supervisor" in Grade of Rs. 425-750.

2. **Senior Technical Assistant** (For Central Library)

Scale of Pay : Rs. 550-25-750-EB-30-900 Plus usual allowances as admissible under the Rules.

Qualifications & Experience ; Good *Bachelor's Degree of a recognised University* plus Degree/Diploma in Library Science.

Master's Degree in Library/Information Science preferable. At least 3-5 years' working experience in a big reputed Library in a responsible capacity.

Candidates should be well conversant with acquisition, processing, handling *of large volume of current journals,* identification, collection and dissemination of scientific and technical data and acquainted with the existing information systems and tools etc.

Deserving candidates may be given higher initial start.

3. **Library Assistants** (For Central Library) : 1 post is reserved for SC/ST candidates.

Scale of Pay : Rs. 380-12-440-EB-15-*560-EB-20-640 plus usual* allowances as admissible under the Rules.

Qualifications & Experience : Graduate of a recognised University with a Bachelor's Degree in Library Science.

At least 2-3 years experience of working in an Academic/Research Library.

Candidates who possess the requisite qualifications and experience may apply stating name, date of birth, details of academic qualifications and experience with copies of Certificates, testimonials etc. together with a crossed Indian Postal Order payable to the Registrar, I.I.T., Bombay for Rs. 3/- (0.75 paise for SC/ST) for posts at Sr. Nos. 1 & 2 and Re 1/- (0.25 paise for SC/ST) for post at Sr. No. 3 to the Registrar, Indian Institute of Technology, Powai, Bombay-400 076 on or before **30-4-1979**.

OSMANIA UNIVERSITY

HYDERABAD-500 007 (A.P.)

Advertisement No. 7/1979

Applications, in the prescribed form, together with the registration fee of Rs. 5/- are invited for the following posts in the University service, so as to reach the undersigned on or before **1st May, 1979**.

1. Professor of Psychology : Rs. 1500-60-1800-100-2000-125/2-2500
2. Reader in Public Administration : Rs. 1200-50-1300-60-1900
3. Lecturers in Public Admn. : Rs. 700-40-1100-50-1600
4. Documentation Officer (Public Admn.) : Rs. 700-40-1100-50-1600
5. Lecturers in Business Management : Rs. 700-40-1100-50-1600

AGE

Professor—Not above (50) years
Reader—Not above (40) years
Lecturers/Documentation Officer—Not above (35) years

NOTE

- (i) Age limit does not apply to the employees of this University.
- (ii) Relaxation in age to the extent of five years may be granted to candidates belonging to S.Cs., S.Ts. and B.Cs., for the posts of Lecturers only.
- (iii) The teachers of affiliated colleges who have put in at least five years service in any of the college affiliated to the Osmania University may be given relaxation in age to the extent of five years.
- (iv) Age relaxation can be considered in deserving cases.

14%, 4% and 25% reservations are made for Scheduled Castes, Scheduled Tribes and Backward Classes respectively only in case of Lecturers.

Application forms can be had from the Director, Department of Publications and University Press, Osmania University, Hyderabad-500 007, A.P. (India) on payment of Rs. 4.50 in person or by money order or by a postal order UNCROSSED made payable to the Director, University Press, O.U. by sending a self-addressed envelope (11½ x 26½ cms.) duly stamped for ordinary or registered post.

Full particulars can be obtained on requisition from the Director, Osmania University Press, **free of cost,** by sending a self-addressed stamped envelope.

B. Ramchandra Reddy
REGISTRAR

THE UNIVERSITY OF KASHMIR

SRINAGAR-190006

NOTICE

Applications on the prescribed application forms which can be had from the Registrar, University of Kashmir, Hazratbal, Srinagar-190006 on payment of Rs. 6/- in cash or by sending a crossed postal order drawn in favour of the Registrar cashable at Srinagar Post Office, are invited for the below noted posts:-

S. No.	Post	No. of posts	Scale of Pay
			Rs.
1.	Co-ordinator (National Adult Education Programme)	One	1100-1600
2.	Officer Incharge of Trainings	One	700-1300
3.	Officer Incharge of Follow up action	One	700-1300
4.	Officer Incharge of Materials	One	700-1300

Details with regard to the qualifications and experience for each post can be had from the office of the undersigned.

S.S. Rizvi
REGISTRAR

RABINDRA BHARATI UNIVERSITY

CALCUTTA-700 007

Employment Notice No. RB/35

Applications are invited for the post of Deputy Registrar in the scale of Rs. 1100-50-1600 (likely to be revised soon) plus usual benefits of contributory P.F., H.R.A. and D.A. as may be admissible. Higher initial pay may be considered in the case of exceptionally qualified candidate. (The post is at present temporary but likely to be made permanent).

Qualifications :—(a) Essential : Good Master's Degree of any recognised University; administrative experience for at least three years with experience of conducting University examinations. (b) Desirable : Administrative experience preferably as Deputy Registrar/Deputy Controller/Assistant Registrar/Assistant Controller of Examinations of any University or Head of any other recognised Institute not below the rank of a college. Age: not above 50 years as an 1.4.79, relaxable in case of specially qualified candidate. Four copies of applications in the prescribed forms (available from the University office) along with attested copies of mark-sheets from S.F./Matriculation/H.S. onwards must reach the Registrar by **30.4.79**, together with a non-refundable fee of Rs, 5.00 only by *crossed Indian Postal Order* payable to RABINDRA BHARATI. Candidates who applied for the same post in response to employment notice No. RB/23 and RB/26 need not apply again. Their applications will be duly considered.

BANARAS HINDU UNIVERSITY

Advertisement No. 10/1978-79

APPLICATIONS are invited for the undermentioned posts. The benefit of Provident Fund/Pension, Dearness Allowances, House Rent Allowances and City Compensatory allowances are admissible according to University Rules. The retirement age of University employees is 60 years, The appointment will be made on two years probation for all permanent posts. Higher starting salary within the grade is admissible to specially qualified and experienced candidates.

Applications will be entertained on the prescribed form duly supported with a Bank Draft or Crossed Indian Postal Orders for Rs 7.50 in favour of the Registrar, Banaras Hindu University towards the application fee. Application forms alongwith the leaflet of information will be supplied free of cost by the Registrar (Selection Committee Section), Banaras Hindu University, Varanasi-221005 on receipt of Re 0.55 paise stamped self-addressed *envelope of 23 cms x 10* cms. size. Candidates called for interview for these posts will be paid actual Railway fare by the Second Class plus reservation charges for sleeper, if paid, and/or actual Bus fare from the present residence, bothways by the shortest route as per University Rules. No other expenses will be paid.

Applications for each post be sent separately alongwith attested copies of certificates in support of the qualifications and experience mentioned in the application be addressed to the Registrar (Selection Committee Section), Banaras Hindu University, Varanasi-221005.

Incomplete application in any respect will not be entertained for consideration.

Those who are in services should apply through proper channel. M.O. or cheque will not be accepted towards the application fee.

For the posts of Lecturers, other things being equal preference will be given to Scheduled Caste/Scheduled Tribe candidates who are considered fit.

Applicants may send their bio-data alongwith attested copies of all the certificates and details on plain paper alongwith the application fee of Rs 7.50 in Bank Draft/I.P.O. to avoid delay in case they do not get the prescribed form in time.

Last date for receipt of application is **April 21, 1979.**

Note :—Number of vacancies are tentative and can vary according to needs.

Institute of Medical Sciences

Grade

Professors— Rs 1500-60-1800-10-2000-125/2-2500 (NPA admissible only to medical graduates as per rules).

Reader — Rs 1200-50-1300-60-1900. (NPA admissible only to medical graduates as per rules).

Lecturer—Rs 700-40-1100-50-1600 (NPA admissible only to medical graduates as per rules).

Professor

(1) Obst. & Gynaecology (2) Psychiatry.

Readers

(3) Anatomy, (4) Biochemistry, (5) Physiology, (6) *Pathology* (7) Microbilogy, (8) ENT, (9) *Surgery (Cardio-Thoracic),* (10) *Surgery (Urology)* (11) *Surgery (Plastic Surgery).*

Lecturers

(12) Physiology (two posts), (13) Medicine (Neurology) (14) Medicine (three posts), (15) Suregry (Neurosurgery), (16) Anaesthesiology (two posts).

Qualifications for the posts of Professors, Readers & Lecturers:

Essential : (i) MBBS or equivalent qualification recognised by the Medical Conncil of India and must be registered under the State/Central Medical Registration Act.

(2) *As detailed below against the subject/speciality. (3) (a) Five years teaching experience as Associate Professor/Reader in the subject/speciality in a Medical College (for the posts of Professor's only)

(b) Three years teaching experience as Assistant Professor/Lecturers in subject/speciality in a Medical College (for the posts of Reader only).

(c) The requisite recognised Postgraduate qualification in the subject and three years teaching experience as Tutor/Demonstrator/Resident *in the subject/speciality of which one year should be after Postgraduate qualification for the posts of Lecturers only).*

Desirable : (1) Research experience and publication, in the subject.

Essential Qualification: No 2—Post-Graduate qualification in the subject/speciality are as follows:

For Ot [illegible] (Obst. & [illegible] Gynaec), [illegible] *(Mid. & Gynaec.) MO/MRCOG. speciality Board of Obst. & Gynaecology (USA).*

For Psychiatry—MD *(Psychiatry)/* MD *(Psychological Medicine). MD/ MRCP in Medicine with Diploma in Psychological Medicine speciality Board* of Psychiatry and Neurology (USA).

For Anatomy, Physiology, Bio*chemistry*— M.S./M.D., M.Sc. Ph.D., D.Sc. *in the subject.*

For Pathology—MD (Pathology or Pathology & Bacteriology or Pathology with Bacteriology), M.Sc. (Medical Pathology), Ph.D./D.Sc. (Pathology). Speciality Board of Pathology, USA, MRCPath (Lond) or MCP (Australia) after Exam.

For Microbiology—MD(Bacteriology or Microbiology or Bacteriology with Pathology or Pathology and Bacteriology), M.Sc., Ph.D., D.Sc. in Microbiology or Bacteriology.

For ENT—*MS (Oto-Rhino-Laryngology), speciality Board of Oto-Rhino-*Laryngology (USA) FRCS (ENT).

For Surgery (Thoracic Surgery)—(1) M.Ch. (Thoracic Surgery) or (2) *Speciality Board of Thoracic* Surgery (USA), *MS/FRCS in Surgery with 2 years of special training in Thoracic Surgery.*

For Surgery (Urology)—(1) M.Ch. (Urology) or (2) *Speciality Board of* Urology (USA) *MS/FRCS in Surgery with 2 years special training in Urology.*

For Surgery (Plastic)—(1) M.Ch. (Plastic Surgery) or (2) Speciality Board of Plastic Surgery *(USA) MS (Surg/ Orth) FRCS in Surgery with 2 years training in Plastic Surgery.*

For Surgery (Neuro Surgery)—(1) M.Ch. (Neosurgery) or (2) Speciality Board of Neuro-Surgery (USA), MS/FRCS in Surgery with 2 years special training in Neuro-Surgery.

For Medicine (Neurology)—(1) DM (Neurology) or (2) Speciality Board of Psychiatry & Neurology (USA) MD/ MRCP in Medicine with 2 years special training in Neurology.

For Medicine (General) — MD (Medicine or General Medicine) MRCP Speciality Board of Internal Medicine USA.

For Anaesthesiology — MD / MS (Anaesth) Speciality Board of Anaesthesiology (USA), FFARCS (by examination).

NOTE : (1) Non-Medical candidates in Anatomy, Microbiology with M.Sc. Ph.D., D.Sc. qualification in the subject will also be considered.

2. Post No. 5. (Reader in Physiology) and one of the two posts at post No. 12 (Lecturer in Physiology) belong to Institute of Medical Sciences (PGIIM).

17. Professor in Dental Surgery

Qualifications : Essential : (1) BDS recognised by Dental Council of India (2) MDS, FDS or equivalent qualification recognised by Dental Council of India (3) Teaching experience as Reader in Dental Surgery for five years in a *Medical College or a Dental College.* Desirable : (1) Research & Publications in the subject/speciality. (2) MBBS degree.

18. Lecturer in Dental Surgery

Qualifications : Essential : (1) BDS recognised by Dental Council of India (2) MDS, FDS or equivalent qualification recognized by Dental Council of India ; (3) Teaching experience as Resident/Clinical Registrar in Dental Surgery for 3 years of which one year *should be after PG qualification. Desirable : (1) Research & Publication in the subject.*

Faculties of Science & Humanities
Grade

Professor—Rs. 1500-60-1800-100-2000-125/2-2500.

Reader—Rs. 1200-50-1300-60-1900. Lecturer—Rs. 700-40-1100-50-1600.

19. Professor of Applied Arts

20. Professor of Mathematics

21. Professor of Linguistics (School of Languages)

22. Professor of Management.

Qualifications

An eminent scholar with published work of high quality, actively engaged in research. Ten years experience of teaching and/or research. Experience of guiding research at Doctoral level.

OR

An outstanding scholar with established reputation who has made significant contribution to knowledge.

23. Reader in Urdu

24. Reader in Journalism & Mass Communication (Spl. in Communication research preparation materials seminar publication).

Qualifications

Good academic record with a Doctoral Degree or equivalent published work. Evidence of being actively engaged in (i) research or (ii) innovation in teaching methods or (iii) production of teaching materials.

About five years experience of teaching and/or research provided that atleast three of these years were as Lecturer or in an equivalent position.

This condition may be relaxed in the case of candidates with outstanding research work.

25. Reader in History of Science and Technology (Deptt. of Ancient Indian History, Culture & Archaeology).

Qualifications

Good academic record with Master's Degree in Science or Technology or Ancient Indian History, Culture & Archaeology and with a Doctoral Degree or equivalent published work. Evidence of being actively engaged in (i) research or (ii) innovation in teaching methods or introduction of teaching materials.

About five years experience of teaching and/or research provided that at least three of these years were as lecturer or in an equivalent position.

This condition may be relaxed in the case of candidates with outstanding research work.

26. Lecturer in Philosophy/Indian Philosophy & Religion (Three posts).

27. Lecturer *in Bengali.*

28. Lecturer in Arabic (Modern Arabic).

29. Lecturer in Urdu (Mahila Mahavidyalaya Other things being equal preference will be given to women candidate).

Qualification : Essential

(1) A Doctor's Degree or research work of an equally high standard; and

(2) Consistently good academic record with first or high second class (B) in the seven point scale) Master's degree in a relevant subject or an equivalent degree of foreign university.

Having regard to the need for developing inter-disciplinary programme, the degrees in (1) and (2) above may be in relevant subjects.

Provided that if the Selection Committee is of the view that the research work of a candidate as evident either from his thesis or from his published work is of very high standard, it may relax any of qualifications prescribed in (2) above.

Provided further that if a candidate possessing a Doctor's Degree or equivalent research work is not available or is not considered suitable, a person possessing a consistently good academic record (weightage being given to M.Phil or equivalent degree of research work of quality) may be appointed provided he has done research work for atleast two years or has practical experience in a research/laboratory/organisation on the condition that he will have to obtain a Doctor's Degree or given evidence of research work of equivalent high standard within five years of his appointment. failing which he will not be able to earn future increments, until his fulfils these requirements ;

Explanation

1. Candidates for being eligible for recruitment to the posts of Lecturers must have a first or high second class (B in the seven point scale) at the Master's level and for determining High Second Class the mid-point between the minimum percentage of marks fixed by a university for award of second division and first division may be taken for determining consistently good academic record, an average of 55% may be expected at the two examinations prior to the Master's Examination (irrespective of the marks obtained in any of the two examinations) or 50% marks in each of the two examinations separately.
2. A candidate who has obtained 52% marks at the Higher Secondary/Pre-University/Intermediate and 58% at the degree level would have an average of 55% and as such could be considered.
3. A candidate who has obtained 60% at Higher Secondary/Pre-University/Intermediate and 50% at the degree level would have an average of 55% and as such could be considered.

Institute of Technology

30. Reader in Mining Geology.

Grade : Rs. 1200-50-1300-60-1900.

Qualifications: Essential (1) Doctorate Degree in the subject or published work of an equally high standard. (2) A first or second class Master's degree in the subject or an equivalent qualification. (3) About five years experience in responsible position in teaching, research/industry. Desirable : (1) Research publications in standard journals. (2) Membership of learned bodies and societies.

Note :—Those who have obtained Doctor's Degree in the subject concerned will also be considered irrespective of the fact whether they have a post-graduate degree in the subject or not.

INDIAN INSTITUTE OF TECHNOLOGY KANPUR

KANPUR-208016

Advertisement No. 14/79

Applications are invited for a post of Junior Pilot Instructor (Gliders) in the scale of pay of Rs. 700-40-900-EB-40-1100-50-1300.

Minimum Qualifications

Holder of Glider Pilot's Licence with Open Rating upto 600 kg., 1000 launches as Pilot-in-command, with 250 hours of flying, out of which atleast 50 hours should be instructional flying.

Age : Below 35 years on 1.1-1979.

Nature of duties to be performed

To conduct flights for academic programme of the Department; to carryout flights for research and development in flight mechanics by taking aero toes; to hold abnitio and advanced instructional flying to the members of the Gliding & Soaring Centre managed and pupported by the Department of Aeronautical Engineering; and to carryout Test flights of Prototype gliders.

The post is permanent and carries retirement benefits in the shape of CPF Scheme or CPF-cum-Gratuity Scheme or GPF-cum-Pension-cum-Gratuity Scheme as may be opted according to rules. The age of retirement is 60 years. During the first year, the appointment will be on probation. Besides pay, post carries allowances according to the Institute rules, which at present correspond to those admissible to the Central Government employees stationed at Kanpur. Candidates called for interview will be paid second class railway fare from the place of duty to Kanpur and back by the shortest route.

Application must be made on prescribed from obtainable free of charge from the Registrar of the Institute by sending a self-addressed unstamped envelope of 25 cm x 10 cm size.

Application accompanied by a postal order for Rs. 7.50 (Rs. 1.87 for SC/ST candidates) should reach the Registrar, Indian Institute of Technology, Kanpur-208016 (U.P.) on or before **April 30, 1979.**

Free higher education in Karnataka

The Karnataka State Government has made higher education free for students of all communities with an annual family income of Rs. three thousand six hundred from the next academic session. The students in this category will not be required to pay tuition and laboratory fee. State Social Welfare Minister, Shri L. G. Havanur said recently in Bangalore that fee concession available to students with annual family income of Rs. ten thousand would be withdrawn from the next academic year. The saving of Rs. thirty four lakhs effected in the budget of the state social welfare department would be used for award of scholarships to students belonging to backward communities and the balance will be invested as share capital in the Scheduled Castes and Tribes Development Corporation. The State Minister said the Central Government would provide a matching grant to the Corporation.

Assam teachers set up research centre

The Assam College Teachers Association proposes to take up various educational development projects out of their funds. The Association will establish a library-cum-research centre at an estimated cost of Rs. six lakhs in the ACTA premises. The teachers will contribute for the centre from the amount they received as arrears on account of revision of their pay-scales. The Association plans to give more importance to academic and research programmes involving all the college and university teachers. There is also a proposal to introduce regular annual lecture series by inviting prominent educationists for the benefit of teachers, students and community.

Osmania offers four-year engineering course

The Academic Council of the Osmania University at its recent meeting decided to offer four-year professional degree course in engineering and technology from the next academic session. The Council also approved the introduction of B.Ed. and M.Ed. correspondence courses. The specialisation in the field of chemistry at postgraduate level will now be offered at the two university colleges. The evening college of arts and commerce will be converted into a day college as most of the students were found to be not in service.

A list of Doctoral Theses Accepted by Indian Universities

PHYSICAL SCIENCES

Mathematics

1. Bera, Kachiram. On already unified field theory and problems singularities in general relativity. University of Calcutta.
2. Ganguly, Ashok. Some topics in summability. University of Saugar,
3. Khandualo, Devaraj. Some inclusion relations between summability methods. Berhampur University.
4. Nagore, C. Sri Hari. Studies in ordered semigroups. University of Madras.
5. Patel, Madhubhai Devachanddas. Some exact solution of stationary space time: Einstein's field equation. Sardar Patel University.
6. Sharma, Jai Kishore. Some contribution to transportation problems. Meerut University.

Operational Research

1. Madan, Sudhir. Cybernetic queueing systems. University of Delhi.

Statistics

1. Parikh, Ashok Manilal. Some problems in fractional factorial designs. M.S. University of Baroda.

Physics

1. Bhatnagar, Mahender Prasad. Determination of interdiffusion constant activation energy of solenium hased alloys. Awadhesh Pratap Singh University.
2. Deshmukh, Sudha Pranawachandra. Proton magnetic resonance and ultrasonic studies of some binary liquid mixtures. Nagpur University.
3. Goel, Suresh Chander. Thermo-physical properties of some polymeric and monomeric solids. University of Delhi.
4. Guru, Nilamadhab. Studies in nuclear many-body problem. Sambalpur University.
5. Kubakaddi, S.S. Electron two phonon interactions in semiconductors. Karnatak University.
6. Mandal, Sasanka Sekhar. Microscopic theory of electron liquid and its applications to metals. Visva-Bharati.
7. Mahapatra, J.K. Pion-pion scattering. Utkal University.
8. Narayanan Nampoori, V.P. Study of spectra of some indium monohalide molecules. M.S. University of Baroda.
9. *Pal, Sumita. Studies on some properties of ionic* crystals in perfect lattices and lattices with substitutional defects. University of Calcutta.
10. Ratna Rani. Effect of hydrogen diffusion on the solid state properties of iron, cobalt and nickel. Kanpur University.
11. Sambi Siva Rao, Konapala. Studies of surface layer effects on the dielectric behaviour of ferro electric and shear wave velocities in certain titanates. Andhra University.
12. Sengupta, Nandita. Study of collective states in nuclei. University of Calcutta.
13. Srimannarayana, K. Applications of holography and *Speckle photography to some problems in elasticity.* Kakatiya University.
14. Srinivasa Rao, M. Studies on first forbidden beta decay in Ga-72, Pm-149 and Ho-166. Andhra University.
15. *Surinder Singh. Fission track dating and uranium* distribution in pegmatities of Rajasthan State, India. Punjabi University.
16. Verma, Narendra Kumar. Theoretical investigations of the performance of *optical systems. Punjabi University.*

Chemistry

Agarwal, Murlidhar. Study of preseodymium and neodymium complexes of carboxylic acids. University of Saugar.

2. Arvind Singh. Study of the complexometric behaviour of substituted and unsubstituted phenyl thioacetamides. Kanpur University.
3. Bharat Bhushan. Thermal and other physico-chemical studies on some metal complexes of N-aryl substituted dithiocarbamates and their reactions with bis (II-cyclopentadienyl) titanium (IV)/zirconium (IV) dichlorides. University of Delhi.
4. Bhattacharya, Sukla. Studies *in alicyclic compounds:* Koch-Haaf carboxylations and bridge head reactivity. Visva-Bharati.
5. Bhattacharyya, Kalyan. Studies on the effects of dicyandiamide and related inhibitors on the acid corrosion of nickel. University of Delhi.
6. Bohidar, Neeta: Role of irradiation in the thermal decomposition of barium perchlorate and barium perchlorate-barium chloride mixtures. Utkal University.
7. Chaudhury, Satyanarayan. Studies on the oxidation of hydrocarbons. University of Calcutta.
8. *Ghosh, Asim Kumar. Indole alkaloids and their* transformations, University of Calcutta.
9. Goyal, K.C. Studies on cyclopentadienyl, indenyl and cycloheptatrienyl molybdenum (VI)—oxo compounds and their derivatives. University of Delhi.
10. Gupta, Arunkumar. Synthesis and structural studies of bimetallic dithiodeselenocyanate and their complexes. Avadh University.
11. Gupta, Hari Om. Studies on protein metabolism and nutritive quality in maize. Meerut University.
12. Hazela, Basudev Prakash. Coordination complexes of some group (IV) metal halides and alkoxides. Kanpur University.
13. Khan, Mohammed Isreal. Synthesis of dyes and analytical applications of some compounds. Awadhesh Pratap Singh University.
14. Krishnan, P. Structural and solvent effects on hydrolysis of esters. University of Madras.
15. Maiti, Saurindranath. Studies on vinyl polymerization *using initiator systems containing long chain quaternary salts.* University of Calcutta.
16. Mandal, Santosh Kumar. Studies on metal complexes of some hetero donor ligands. University of Calcutta.
17. Manju. A contribution to the chemistry of proteases and related synthetic experiments. University of Delhi.
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